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# MATH: NUMBER RECOGNITION AND SUBITIZING - AIAN



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Early Childhood Development, Teaching and Learning



Every  
Individual is  
Rooted in  
Culture



[Example of a word cloud](#)



# Two-Eyed Seeing

*“Two-Eyed Seeing asks us to see our strengths, the best in our ways of knowing, while also asking us to respect and celebrate our differences. Two-Eyed Seeing acknowledges the necessity of formal structure yet that it must be preamble to and receptive of new understandings and opportunities, i.e., understandings associated with ‘Spirit of the East’ which brings the ‘gift of newness, of transformation.’”*





# 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	Mathematics Development	Perceptual, Motor, and Physical Development
			Literacy	Scientific Reasoning	





# 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

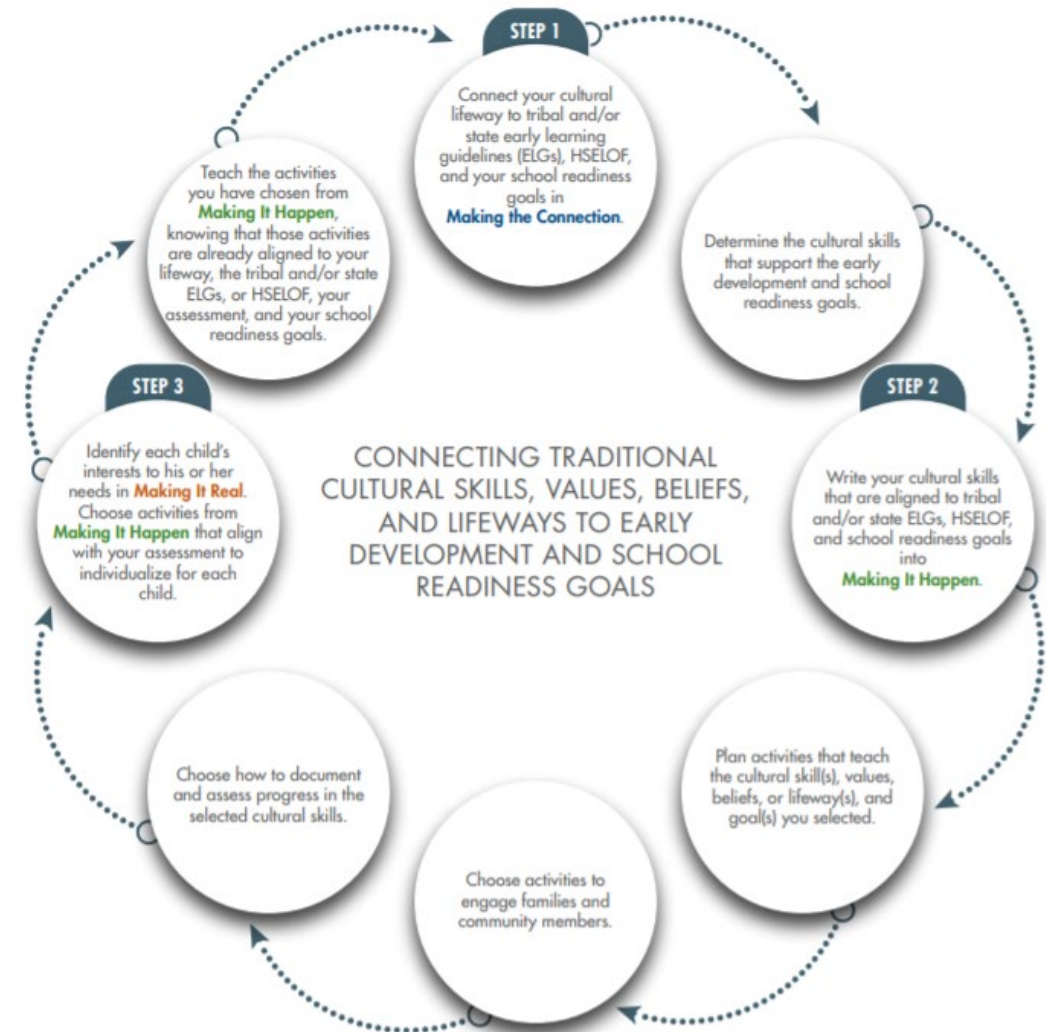


# Making It Work

We were always trying to integrate culture into the curriculum—the science domain, the math domain, etc. Then we realized that culture should be at the base, serving as the foundation, the building block for curriculum development. It was an amazing paradigm shift! We are now making huge gains in integrating language and culture into our early childhood programming.

—The Red Cliff Early Childhood Center

## The *Making It Work* Cycle





# Language and Culture Matter

Without language, the canoe, paddle, water, seat, the birds you hear are different than what our ancestors experienced. If you know the language, then you know what our ancestors heard, saw, felt, and experienced.

—Zalmai “Zeke” Zahir,  
University of Oregon





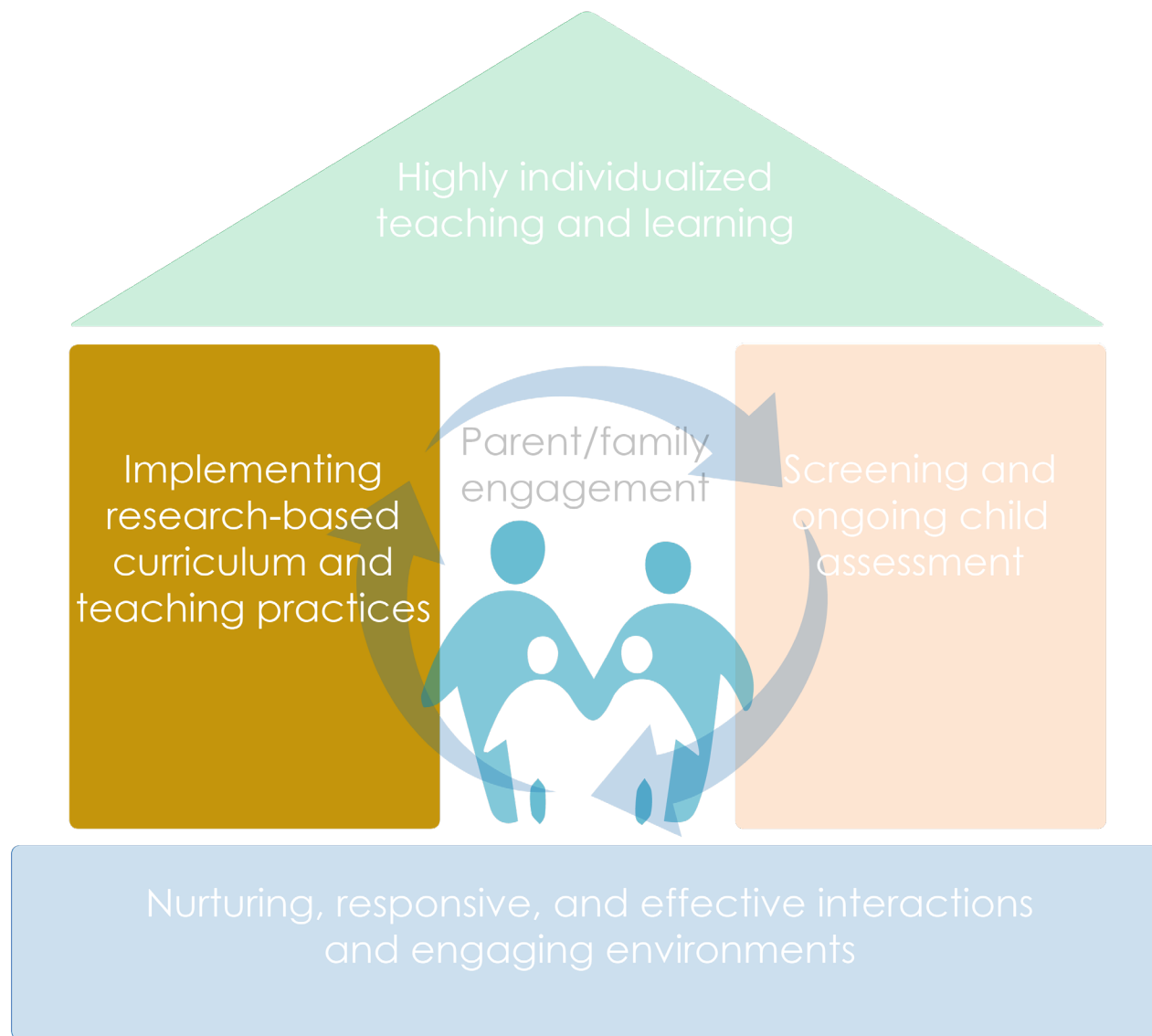




# Parent, Family, and Community Engagement

Culturally and linguistically responsive environments can only be created by engaging and partnering with families, Elders, and the community. Establishing a partnership with families and the community is crucial for children's learning and later success in life.

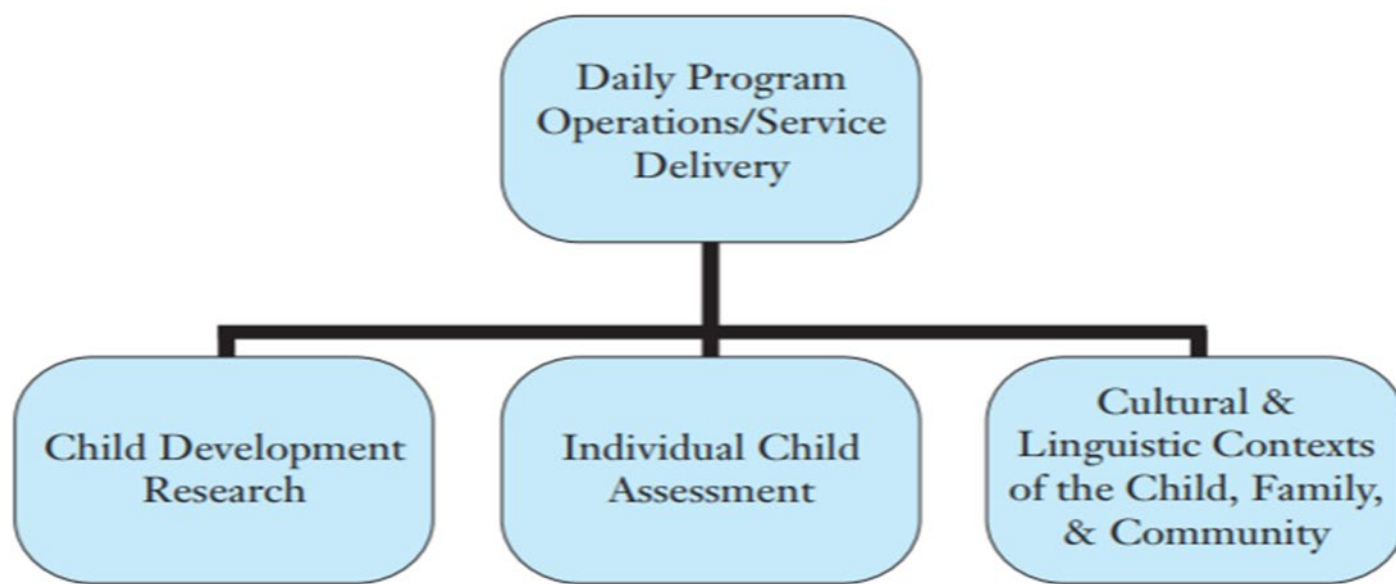






# Culturally and Linguistic Responsive Practices

## Sources of Developmentally Appropriate Practices





# 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
- Use the *Steps and Introduction to Making It Work Guide* to integrate culture and language in lesson plans for math skills





# Subitizing

“Subitizing is a fundamental skill in the development of [children’s] understanding of number.”

(Baroody, 1987)





# Some Examples of Subitizing in the Classroom

- 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







# 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

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- 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

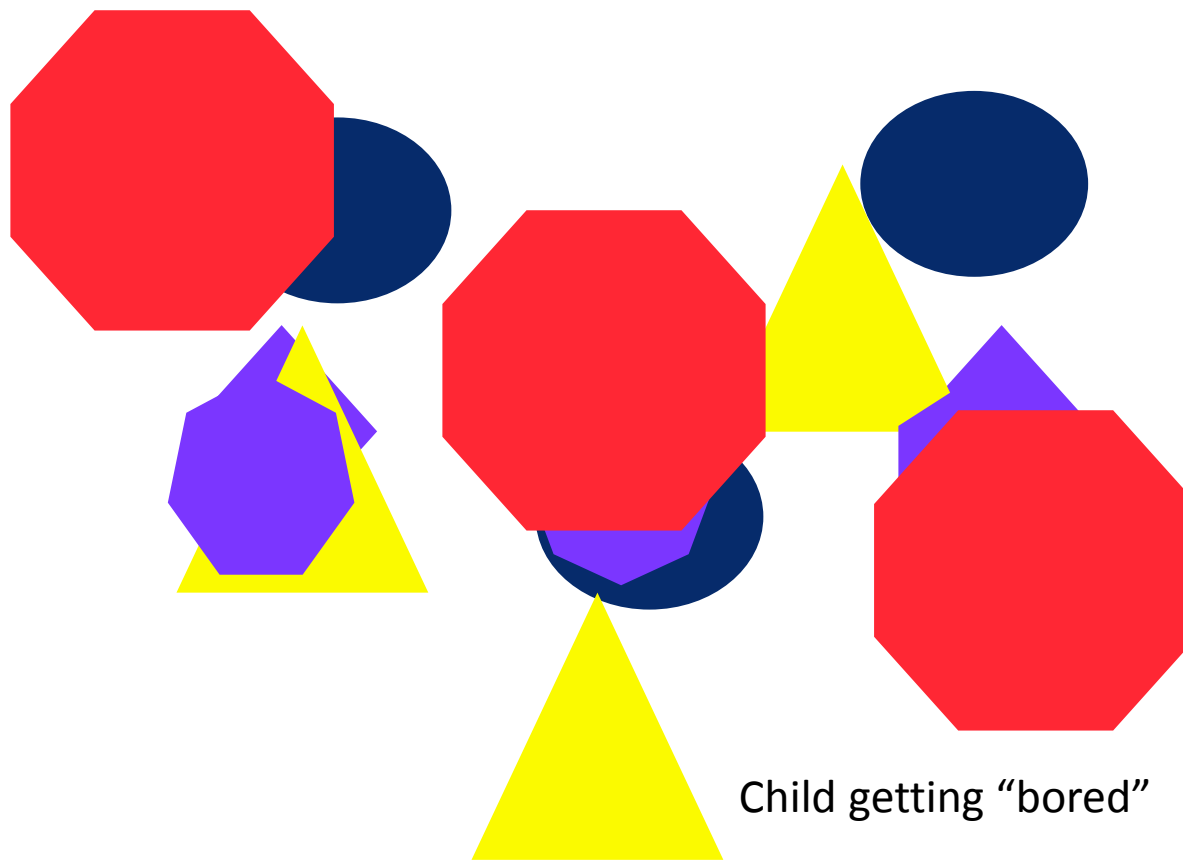




# Young Children and Number

- Infant competencies
- “Habituation” research

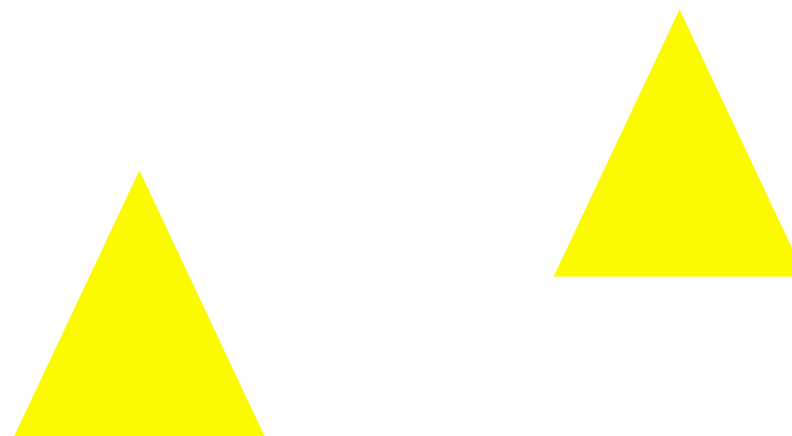




Child getting "bored"



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# 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?





# 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?



# 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).

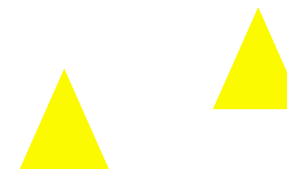
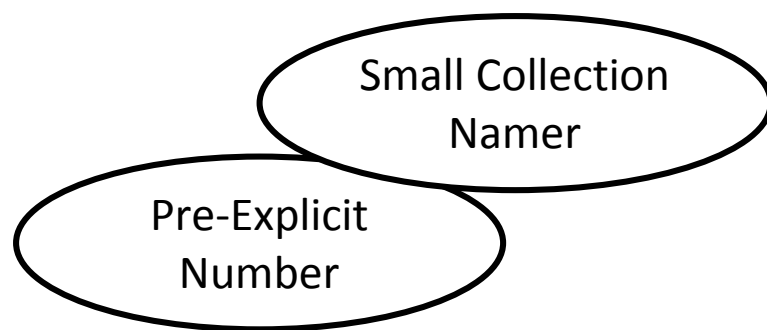
Foundations



# LT Level: Small Collection Namer

- Names groups of 1 to 2, sometimes 3.

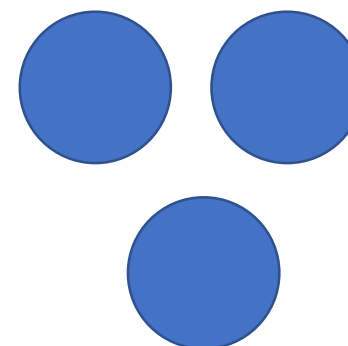
“Two fish!”





# LT Level: Maker of Small Collections

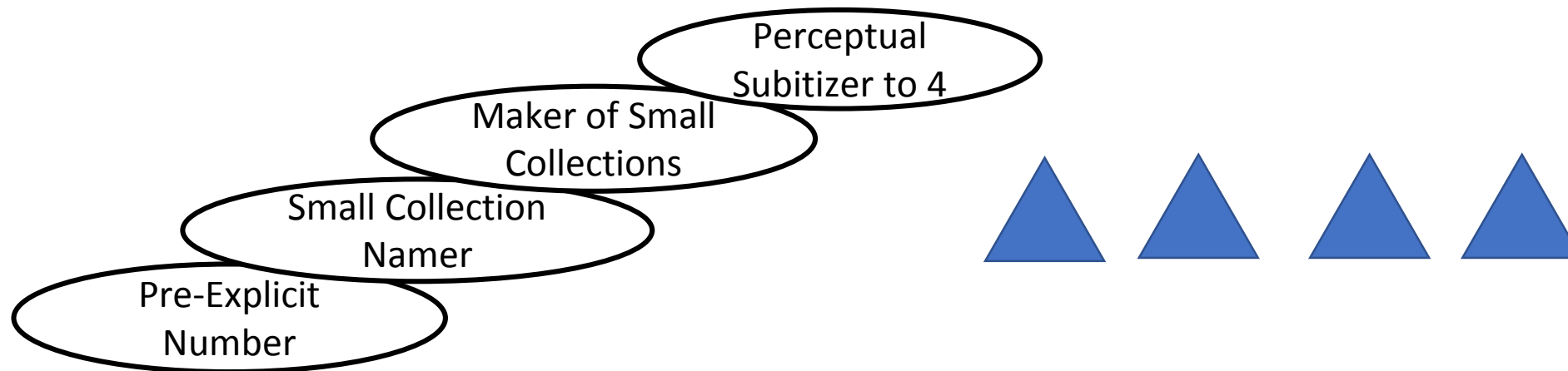
- Makes a small collection (no more than 4, usually 1–3) with the same number as another collection or from the number word.





# LT Level: Perceptual Subitizer to 4

- *Quickly* recognizes collections up to 4 briefly shown and names the number.

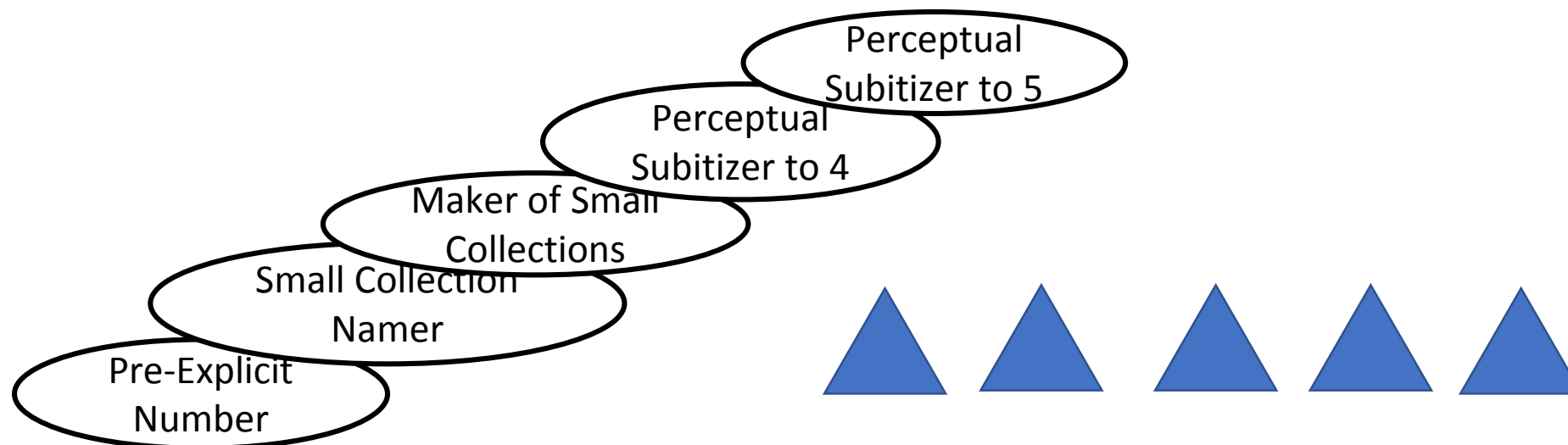






# LT Level: Perceptual Subitizer to 5

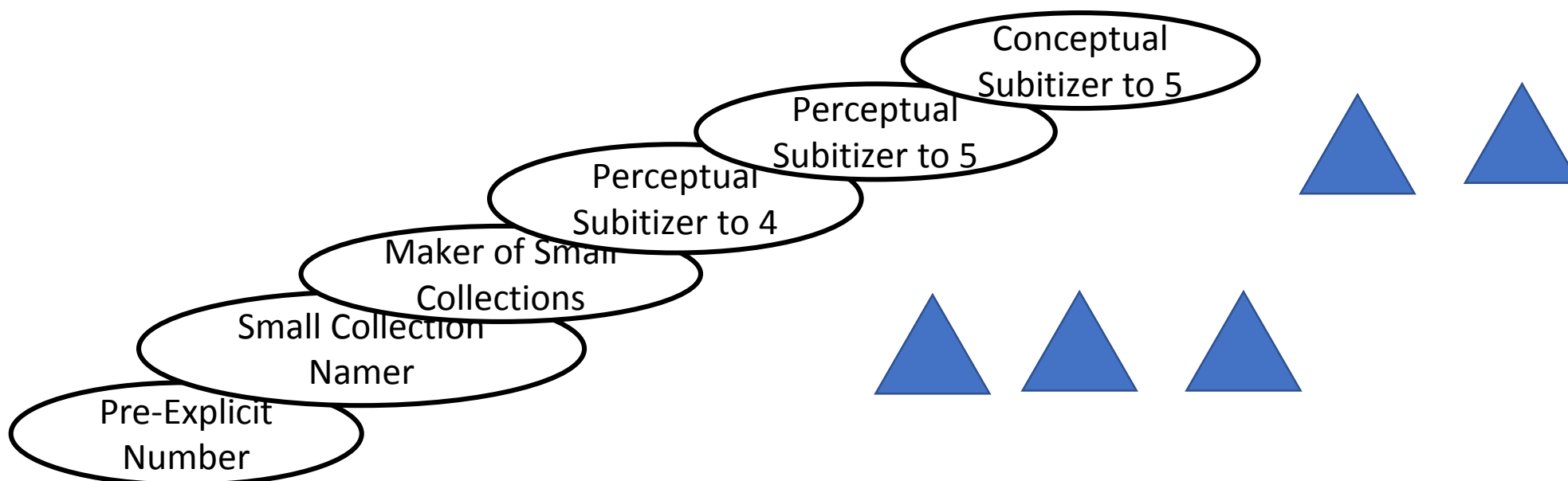
- *Quickly* recognizes collections up to 5 briefly shown and names the number.





# LT Level: Conceptual Subitizer to 5

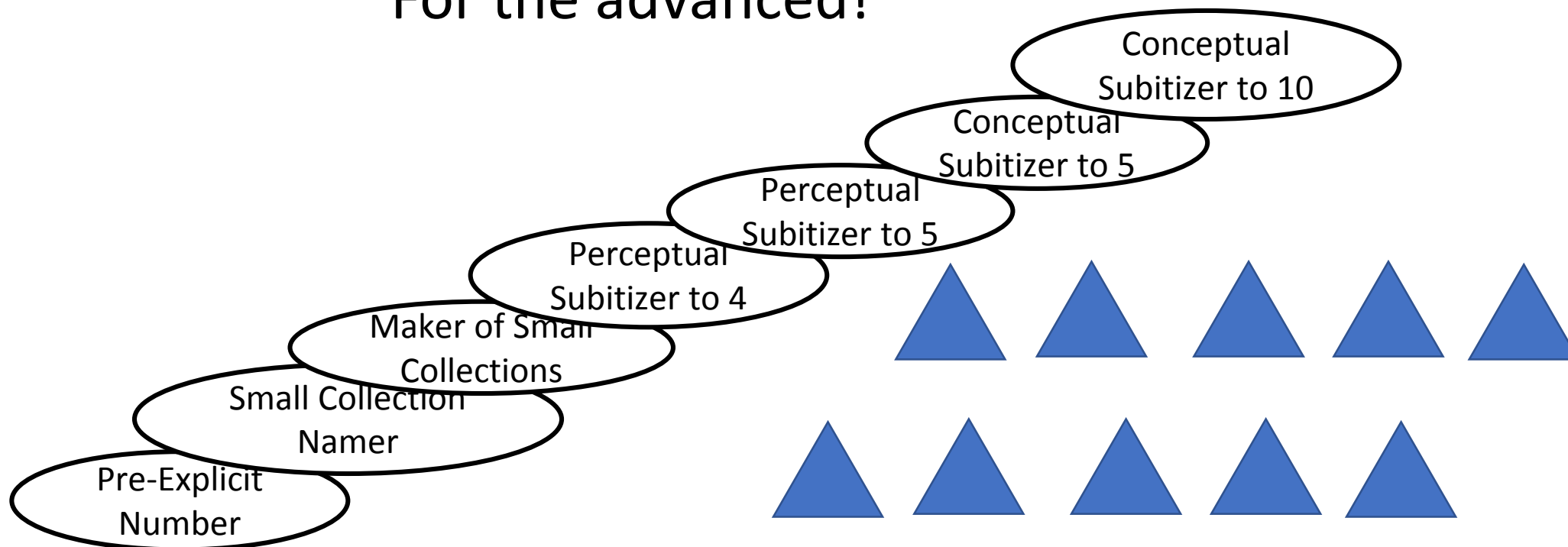
- Names the total in all arrangements to about 5, when shown only briefly.





# 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 children speaking or learning their tribal language.





# Support Subitizing for AIAN Children

1. Choose culturally meaningful and familiar materials
2. Connect math terms to child's tribal language
  - Learn if the child can subitize in their tribal language?
  - Embed language of child in activity
  - Use one or two words and phrases
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?





# Rhythmic Subitizing

Subitizing can also be  
rhythmic

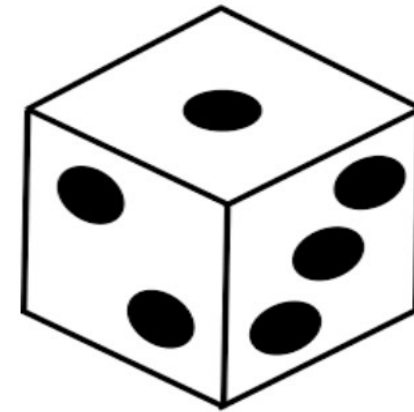


# Supporting Children with Suspected Delays or Identified Disabilities



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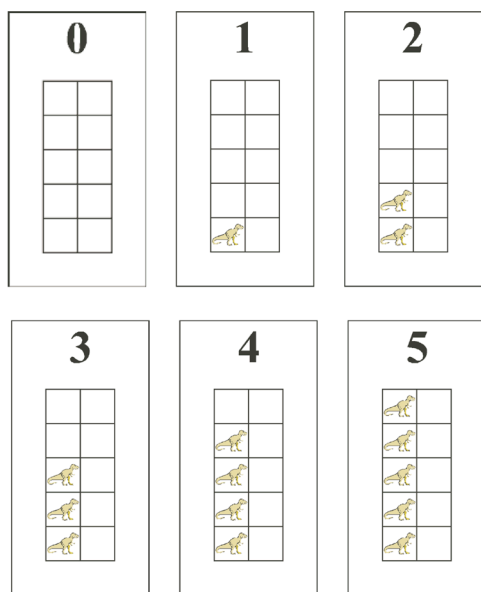
- Subitizing is *especially* important for the mathematical development of children with special needs.
- *Follow the learning trajectory with patience!*
- Use number names *all day*, naturally but intentionally.
- Play a lot of dice and domino games.





# Children with 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 that can be held
  - include lots of *rhythmic* subitizing







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# Review



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