NUMBER RECOGNITION AND SUBITIZING PRESENTER NOTES

This guide walks you through presenting the **Math: Number Recognition and Subitizing** in-service suite. This in-service suite includes PowerPoint slides and supporting materials. The main PowerPoint presentation and optional slides were developed for all professional audiences (teachers, home visitors, family child care providers). Additionally, separate PowerPoint slides were developed for use with home visitors. Learning activities, tip sheets, and activity sheets are labeled for their intended audiences.

MATERIALS:

- Presenter PowerPoint slides (38)
- Introductory video (found on the ECLKC website)—play at the start of your training session, if internet connection is available
- Projector and audio equipment
- Internet connection if you plan to show optional video examples

BEFORE YOU BEGIN:

- This presentation provides participants with information to support their understanding and teaching of math concepts, particularly number recognition and subitizing.
- Participants are encouraged to view this presentation and think about how it pertains to children across all care settings.
- The presentation includes video clips of teachers fostering number recognition and subitizing skills and children engaged in number thinking as they play. Although most of the videos are classroom examples, home visitors can use them for their own professional development and encourage families to replicate.
- Optional learning activities offer participants opportunities to understand how number recognition and subitizing develops and think about strategies that support children's development in this area.
- Adaptation boxes individualize this training for your specific training group.

LIST OF AVAILABLE CONTENT

HANDOUTS

- Number Recognition and Subitizing Stretches Across ELOF Domains
- Tips for Families: Number Recognition and Subitizing
- Tips for Education Staff: Learning Trajectories of Number Recognition and Subitizing
- Tips for Home Visitors: Learning Trajectories of Number Recognition and Subitizing
- Activities for Education Staff: Fantastic Five
- Activities for Families: Help Your Child Learn
- Tips for Education Staff: Supporting Families in Math Learning
- Tips for Home Visitors: Supporting Families in Math Learning
- Tips for Home Visitors: Supporting Children Who Are Dual Language Learners
- Tips for Education Staff: Supporting Children Who Are Dual Language Learners
- Learning Activity for Education Staff: Subitizing Throughout the Day
- Learning Activity for Home Visitors: Brainstorming
- Activities for Families: Brainstorming

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- Helpful Resources
- Tools for Supervisors and Coaches: Number Recognition and Subitizing

OPTIONAL SLIDES

- Optional Slide 1: HSPPS Supports Math
- Optional Slide 2: HSPPS Supports Math
- Optional Slide 3: ELOF Cognition: Infant Toddler
- Optional Slide 4: ELOF Cognition: Preschool
- Optional Slide 5: LT Level: Foundation
- Optional Slide 6: LT Level: Small Collection Namer
- Optional Slide 7: LT Level: Maker of Small Collections
- Optional Slide 8: LT Level: Perceptual Subitizer to 4
- Optional Slide 9: LT Level: Perceptual Subitizer to 5
- Optional Slide 10: LT Level: Conceptual Subitizer to 5
- Optional Slide 11: LT Level: Conceptual Subitizer to 10
- Optional Slide 12: Learning and Teaching with Learning Trajectories

OPTIONAL HANDOUTS

- Head Start Program Performance Standards Supports Math

OPTIONAL SLIDES FOR HOME-BASED CARE (HOME VISITORS) ONLY

- HV Optional Slide 1: Introduction
- HV Optional Slide 2: HSPPS Supports Math
- HV Optional Slide 3: HSPPS Supports Math—Home-Based Programs
- HV Optional Slide 4: Center-Based and Family Child Care Practices
- HV Optional Slide 5: Home Visiting Practices
- HV Optional Slide 6: What's Different for a Home Visitor?
- HV Optional Slide 7: Theory of Change for Home-Based
- HV Optional Slide 8: Support Parents in Speaking Math
- HV Optional Slide 9: Home Visitors Can Support Children's Subitizing

PRESENTATION OUTLINE

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SLIDE	HANDOUTS NEEDED	HOME VISITOR POWERPOINT ADAPTATION	HOME VISITOR HANDOUTS	OPTIONAL SLIDES	OPTIONAL HANDOUTS
1. Math Introduction		▪ Replace with HV Optional Slide 1			
2. Math Stretches Across ELOF Domains					
3. Math Stretches Across	▪ Math Stretches Across ELOF Domains	▪ Insert HV Optional Slide 2 ▪ Insert HV Optional Slide 3		▪ Optional Slide 1 ▪ Optional Slide 2 ▪ Optional Slide 3 ▪ Optional Slide 4	▪ HSPPS Supports Math
4. House Framework for Effective Teaching Practices					
5. House Framework for Effective Teaching Practices					
6. Session Objectives		▪ Insert HV Optional Slides 4-7 after Objectives			
7. Learning Trajectory					
8. Part 1 of the Learning Trajectory					
9. Learning Trajectory Goal for Number Rec/Subitizing	▪ Number Recognition and Subitizing (F)				
10. Not This					
11. Number Recognition					
12. Why is this Goal Important					
13. Part 2 of the Learning Trajectory					
14. Young Children and Number					
15. Habituation Simulation					
16. 2 Yellow Triangles					
17. Perceptual Subitizing					
18. 4 Yellow Cubes					
19. Conceptual Subitizing					

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SLIDE	HANDOUTS NEEDED	HOME VISITOR POWERPOINT ADAPTATION	HOME VISITOR HANDOUTS	OPTIONAL SLIDES	OPTIONAL HANDOUTS
20. What Do You See?					
21. What Did You See?					
22. LT Level: Foundations	▪ Learning Trajectories (ES)		▪ Learning Trajectories (HV)	▪ Optional Slide 5	
23. LT Level: Small Collection Namer				▪ Optional Slide 6	
24. LT Level: Maker of Small Collections				▪ Optional Slide 7	
25. LT Level: Perceptual Subitizer to 4				▪ Optional Slide 8	
26. LT Level: Perceptual Subitizer to 5				▪ Optional Slide 9	
27. LT Level: Conceptual Subitizer to 5				▪ Optional Slide 10	
28. LT Level: Conceptual Subitizer to 10				▪ Optional Slide 11	
29. Part 3 of the Learning Trajectory					
30. Math Language in ECE Rooms		▪ Insert HV Optional Slide 8			
31. What to Do to Help Children Learn Subitizing	▪ Activities for ES—Fantastic Five (ES) ▪ Supporting Families in Math Learning (ES) ▪ Help Your Child Learn (F)	▪ Insert HV Optional Slide 9	▪ Supporting Families in Math Learning (HV) ▪ Help Your Child Learn (F)		
32. Supporting Subitizing for Children Who are DL and Tribal LLs	▪ Supporting Children Who Are DLLs (ES)		▪ Supporting Children Who Are DLLs (HV)		
33. What to Do?	▪ Learning Activity for Education Staff-Subitizing Throughout the Day (ES) ▪ Brainstorming (F)		▪ Learning Activity for Home Visitors: Brainstorming (HV) ▪ Brainstorming (F)		

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SLIDE	HANDOUTS NEEDED	HOME VISITOR POWERPOINT ADAPTATION	HOME VISITOR HANDOUTS	OPTIONAL SLIDES	OPTIONAL HANDOUTS
34. Rhythmic Subitizing					
35. Supporting Children with Suspected Delays and Identified Disabilities					
36. Children with Disabilities					
37. Subitizing					
38. Review	▪ Helpful Resources ▪ Tools for Supervisors and Coaches			▪ Optional Slide 12	

ES: Indicates Tips/Activity Sheet for Education Staff
HV: Indicates Tips/Activity Sheet for Home Visitors
F: Indicates Tips/Activity Sheet for Families

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SLIDE 1:

Welcome and Introductions:

- Begin the training by giving participants background information about yourself.
- Provide an opportunity for participants to introduce themselves.

REFERENCES

- Clements, D. H. 1999. "Subitizing: What Is It? Why Teach It?" T*eaching Children Mathematics* 5(7), 400–405.
- Clements, D. H., J. Sarama, & B. L. MacDonald. 2017. "Subitizing: The Neglected Quantifier." In N. Anderson & M. W. Alibali (Eds.), *Constructing Number: Merging Perspectives from Psychology and Mathematics Education*. Berlin, Germany: Springer.

ADAPTATION FOR HOME VISITORS:

- Replace current slide with HV Optional Slide 1

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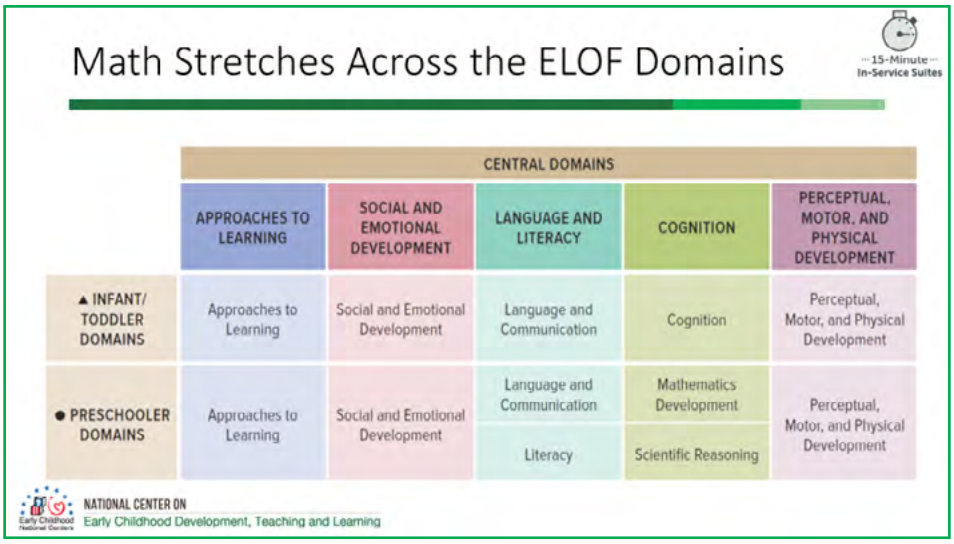

SLIDE 2:

The Head Start Early Learning Outcomes Framework (ELOF) provides language to help teachers, family child care providers, and home visitors understand child development and what children should know and be able to do. The ELOF guides effective program and teaching practices that promote strong outcomes for all children, including children with disabilities or suspected delays and children who are dual language learners or children who are learning a tribal language.

When children learn number recognition and subitizing, they develop skills in multiple ELOF domains, including Approaches to Learning and Cognition. Children are born primed to explore number ideas as they learn about the world. Number recognition and subitizing skills include counting and cardinality, cognitive self-regulation, and communicating and speaking.

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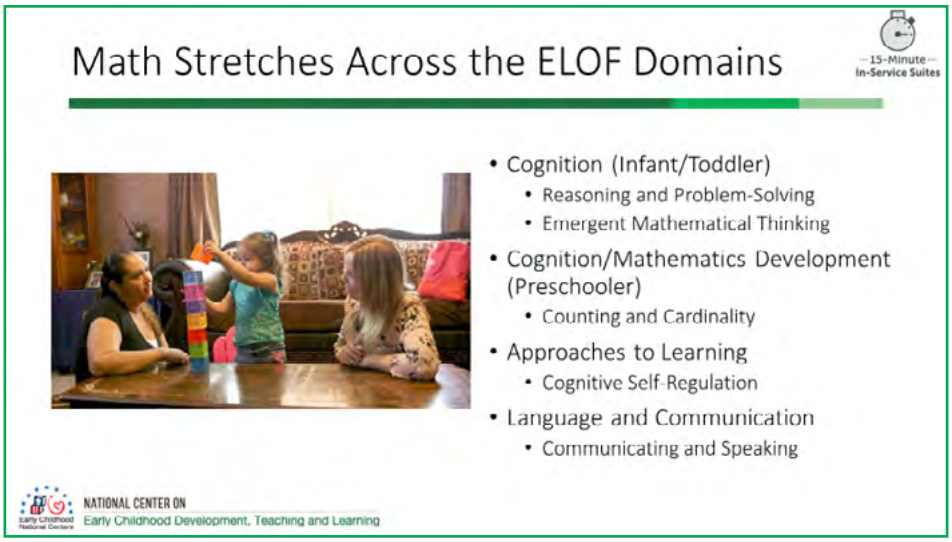

SLIDE 3:

For Infants/Toddlers

- Early math skills and concepts that we know young children can attain are primarily found in the Cognition domain under the subdomains Reasoning and Problem-Solving and Emergent Mathematical Thinking.

For Preschoolers

- The central domain Cognition is comprised of two more specific domains—Scientific Reasoning and Mathematics Development. Mathematics Development includes the subdomain Counting and Cardinality, which this suite focuses on.

Other areas of development connected to math learning include the central domains Approaches to Learning and Language and Literacy.

- For example, the Approaches to Learning domain is about *how* children learn, rather than *what* they learn. It includes executive function skills that are crucial to math exploration like cognitive self-regulation.
- When children use language and nonverbal communication, such as eye gaze and gestures, to express interest and talk about what they observe, they use skills in the Language and Communication domain.

Teaching children in their home language is an important part of connecting math skills to their family, culture, and developmental goals. You support children who are dual language learners or children who are learning a tribal language when you describe what the child is observing and provide key terms in English and their second language.

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MATERIALS NEEDED:

- Number Recognition and Subitizing Stretches Across ELOF Domains

OPTIONAL FOR HS/EHS:

- Insert Optional Slide 1
- Insert Optional Slide 2
- Insert Optional Slide 3
- Insert Optional Slide 4
- Head Start Performance Standards Supports Math

ADAPTATION FOR HOME VISITORS:

- Insert HV Optional Slide 2
- Insert HV Optional Slide 3

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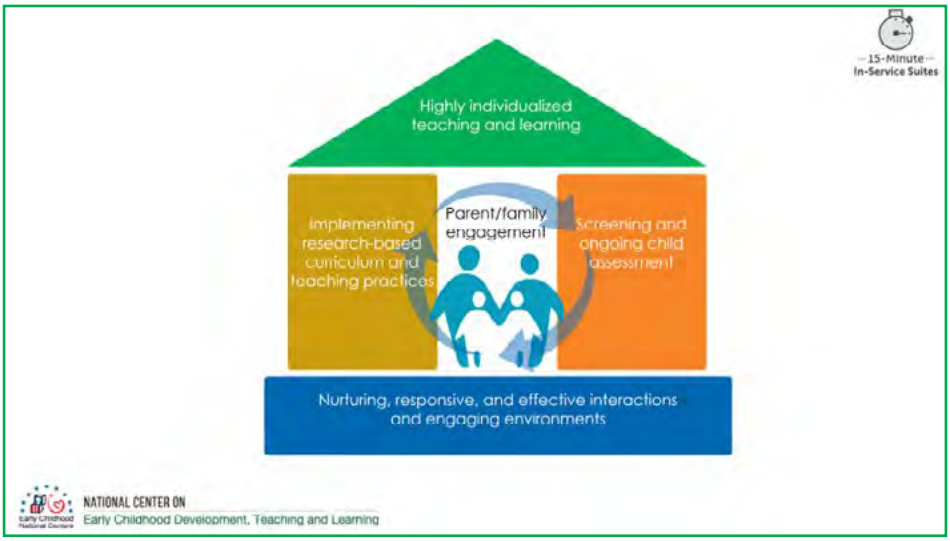

SLIDE 4:

The Framework for Effective Teaching Practices is known as the House. The House represents five integral components of quality teaching and learning:

- The foundation: Nurturing, responsive, and effective interactions and engaging environments
- The first pillar: Implementing research-based curricula and teaching practices
- The second pillar: Screening and ongoing child assessment
- The roof: Highly individualized teaching and learning
- The center: Parent and family engagement

When connected with one another, they form a single structure—the House Framework—that surrounds the family in the center. As we implement each component of the house—in partnership with parents and families—we foster children's learning and development.

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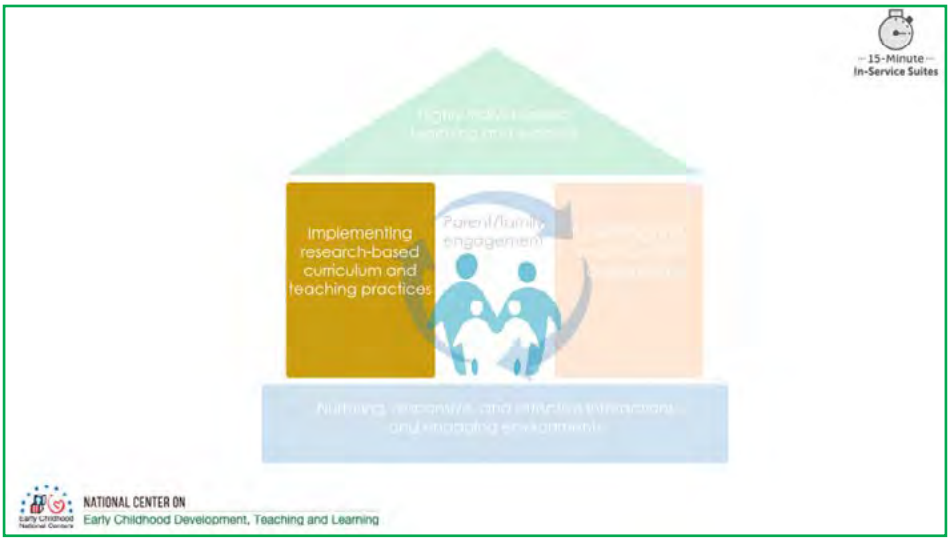

SLIDE 5:

- Number recognition and subitizing is an essential part of implementing research-based curricula and teaching practices.
- Children naturally engage with numbers by counting objects in their environment and identifying numbers during circle time. To gain skills in number recognition and subitizing, teachers and home visitors support children and parents by teaching these skills using research-based curricula and effective practices.

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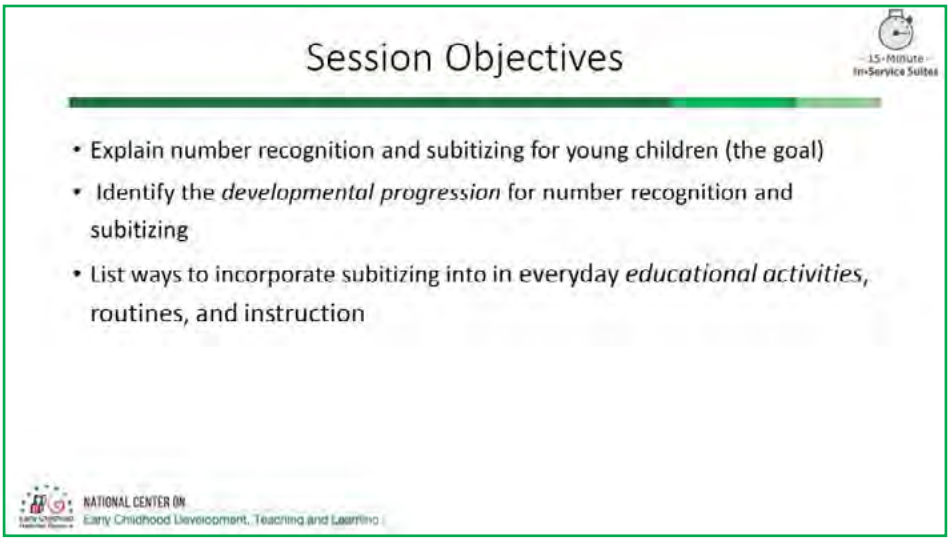

SLIDE 6:

[The screen should be blank] *Before you click, pose the following question to your audience*:

"How many children did you see in the first screen?"

[Take answers]

"Let's look again."

[Click]

"What do you think now? Did you count? If not, *how did you know how many*? That is number recognition—done quickly, it is called 'subitizing.'" It is important to note that number recognition (the ability to recognize how many objects are in a group) is NOT numeral recognition (the ability to read numerals). However, we will talk about this more later in the presentation.

- Review the objectives with attendees.
- Ask if anyone has further for suggestions for what they will like to be able to do by the end of this session.

ADAPTATION FOR HOME VISITORS:

- Insert HV Optional Slides 4-7 to provide a foundation on home visiting practices

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SLIDE 7:

Learning trajectories have three interrelated parts. First, the goal, which is that children accomplish a mathematical ability in a given domain. Next, children move through levels of predictable developmental progressions using educational activities intended to encourage a more complex understanding of a concept. We're going to use a learning trajectory to talk about how children learn to recognize numbers and how adults can support them in that development.

REFERENCES:

- Clements, D. H., & J. Sarama. 2014. *Learning and Teaching Early Math: The Learning Trajectories Approach* (2nd ed.). New York, NY: Routledge.
- Sarama, J., & D. H. Clements. 2009. *Early Childhood Mathematics Education Research: Learning Trajectories for Young Children*. New York, NY: Routledge.

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SLIDE 8:

Let's examine the first part of the learning trajectory—the goal!

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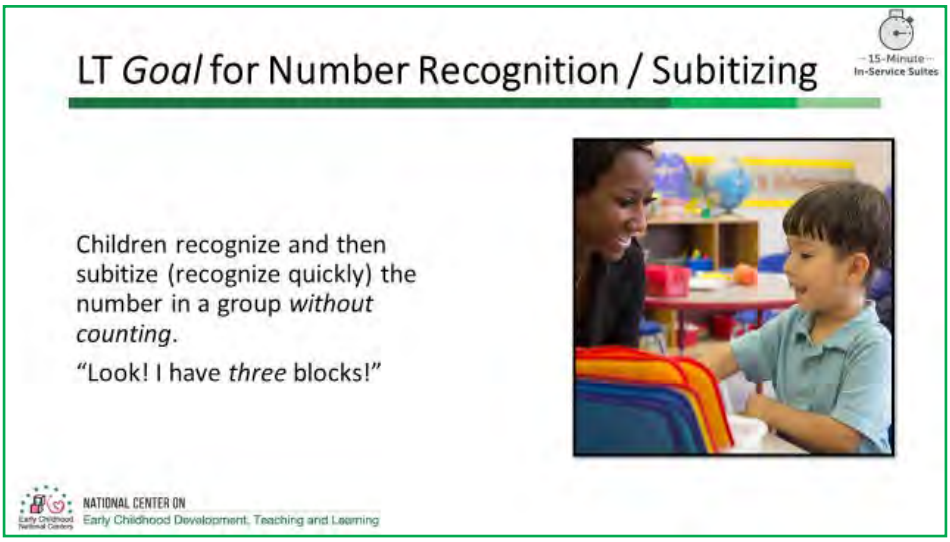

SLIDE 9:

- The goal is for children to recognize the number of objects when they see a group and know how many, without counting!
- **Now we'll look at what number recognition means!**

MATERIALS NEEDED:

- Tips for Families: Number Recognition and Subitizing

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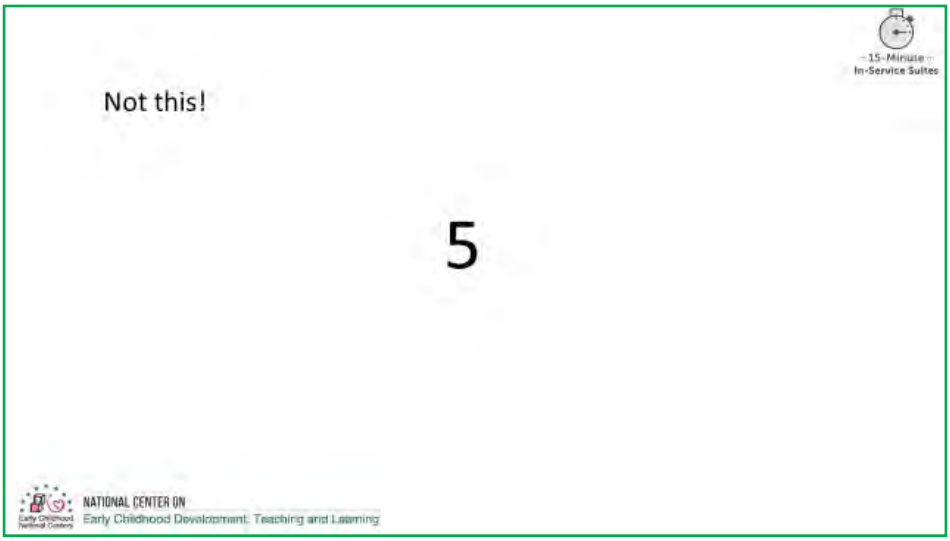

SLIDE 10:

[Briefly pass through this slide after simply saying "Not this—it's not reading numerals" and then moving on to the next slide to explain what it is.]

Numeral recognition is the ability to read numerals, like the 5 you see above. The topic for today is Number recognition—which is the ability to recognize how many objects are in a group. These two concepts are often confused but let's talk more about number recognition so we have a better understanding.

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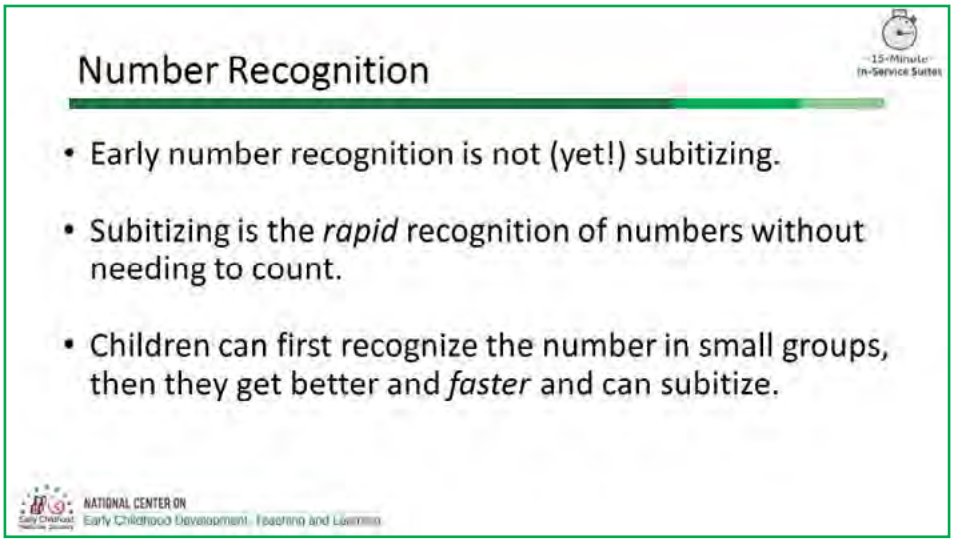

SLIDE 11:

The ELOF identifies subitizing as a goal for preschoolers, however it is good if children can subitize as early as they can. Before we discuss subitizing in more detail, it is important to describe abilities that develop before subitizing—especially for infants and toddlers.

"Subitizing" means "suddenly" or "quickly." When you subitize, you quickly recognize the number in a group. But, in the earliest years, naming numbers is the main goal—even if it takes more than a second or two. Simply naming the numbers is a good start. Therefore, for the youngest children, we say the ability to name small sets is simply "number recognition." Toddlers can do this. Once children become increasingly competent at naming numbers, we move to subitizing or knowing the number in small groups without counting after only seeing the objects for a very brief time (i.e., seconds).

We will describe higher levels of subitizing as we discuss the developmental progression.

In the next few slides, we will discuss why number recognition is important and highlight research with infants to look at the *earliest* abilities that are the foundation for number recognition and subitizing.

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SLIDE 12:

Number sense is children's ability to understand what numbers mean. It is an important early learning outcome in state standards as well as the Common Core and the ELOF.

Number recognition is the earliest developing dimension of number sense. As early as infancy, children start to learn "how many" objects there are, as they become familiar with numbers. Young children will even begin to compare groups of numbers as they develop—getting them ready for subitizing. Children recognize and subitize small numbers to *solve problems*. For example, during play or small group activities, children demonstrate subitizing when they tell their classmates how many objects are in a set, compare numbers, and, later, add or subtract numbers.

Research describes how subitizing helps children learn to count and is particularly important as they begin to understand cardinality (knowing how many you counted). Additionally, subitizing contributes to children's performance on assessments of arithmetic skills above and beyond their general IQ and language skills.

REFERENCES

- Sarama, J., & D. H. Clements. 2009. *Early Childhood Mathematics Education Research: Learning Trajectories for Young Children*. New York, NY: Routledge.
- Hannula, M. M. 2005. *Spontaneous Focusing on Numerosity in the Development of Early Mathematical Skills*. Turku, Finland: University of Turku.

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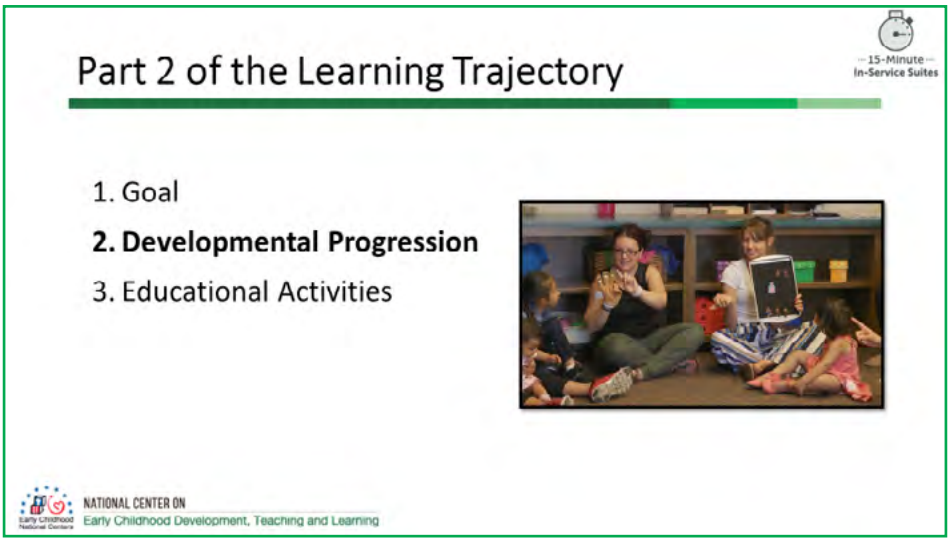

SLIDE 13:

Let's study the *fine-grained levels of the developmental progression*, from infants to five years old.

Infants? Really? Yes, take a look.

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SLIDE 14:

- Even *very* young children are sensitive to number.
- We know this because of research using what is called the "habituation paradigm," where infants lose interest in a series of pictures that differ in some ways, but not others. When an infant has habituated to the pictures, they begin to look at the screen less, and their eyes wander and their breathing becomes more relaxed.

[Click]

- Here is the six-month-old child researchers are studying.
- Instruments, such as those seen here, track electrical signals in the infant's brain (completely painlessly, of course). Scientists have observed that the infant's brain waves move towards sleep as the child habituates.
- Once this child habituates, the researchers change a feature of the display, drawing back the attention of the infant. How does this work?
- Watch what she sees.

Notes for Presenter: The next few animations show—but far more quickly and fewer in number—the type of display a child might see. You can comment as they pass, that the color, shape, and arrangements all change.

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SLIDE 15:

You should see:

1. **[Click]** Three blue circles
2. **[Click]** Three red octagons (Child getting "bored")
3. **[Click]** Two yellow triangles

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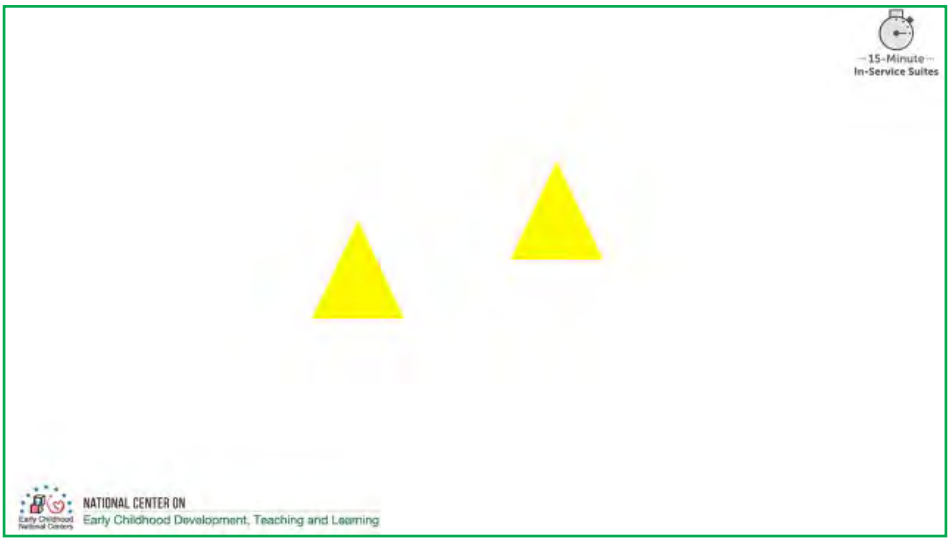

SLIDE 16:

As the child focuses more on the display, her brain is activated and shows higher levels of activity, and her breathing becomes more rapid. All this suggests to us that she is sensitive to the difference between groups of three and groups of two.

However, this hard-wired ability is not linked to language or concepts (for example, infants do not know 2 is *fewer than* 3) until adults provide experiences that *build* on this natural ability.

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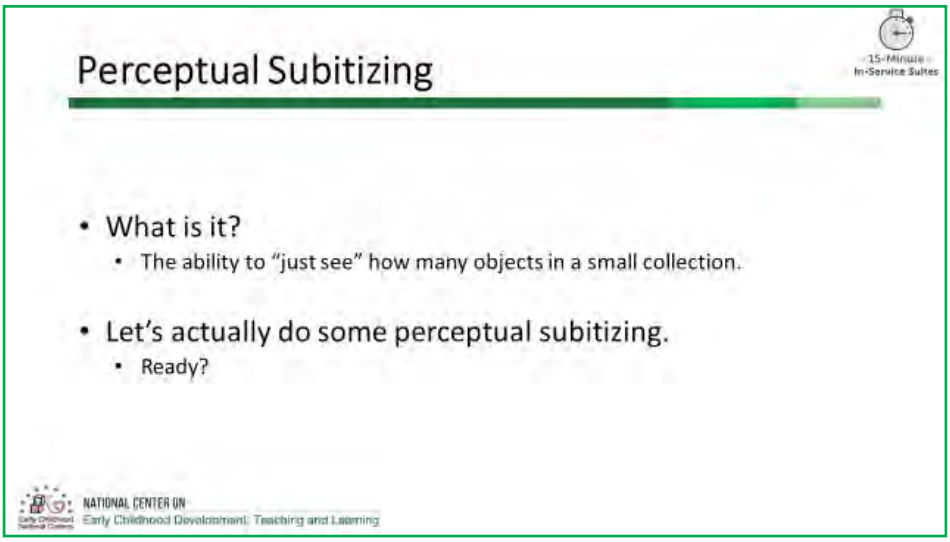

SLIDE 17:

Perceptual subitizing is the ability to see how many objects are in a small collection.

- What are the types of images we just viewed? (answer: small sets)

Let's do some actual perceptual subitizing.

- Ready? Watch the screen! I will show some blocks for just 2 seconds.

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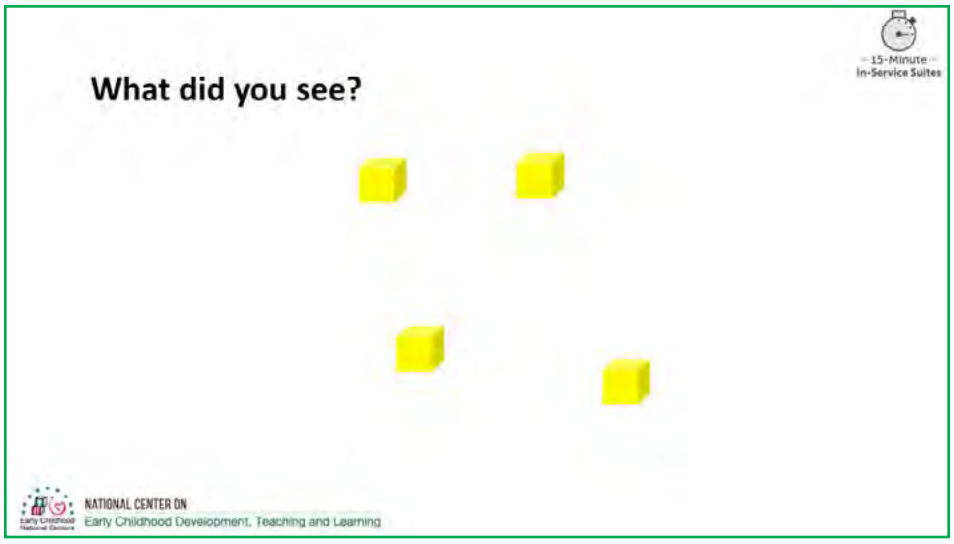

SLIDE 18:

[Let the blocks show and disappear]

[Click]

"What did you see?"

[Click and the blocks reappear] "How did you know?" Discuss.

DISCUSSION POINTS:

- Early perceptual subitizing builds on infant sensitivity, but relies on experiences, especially naming small numbers!

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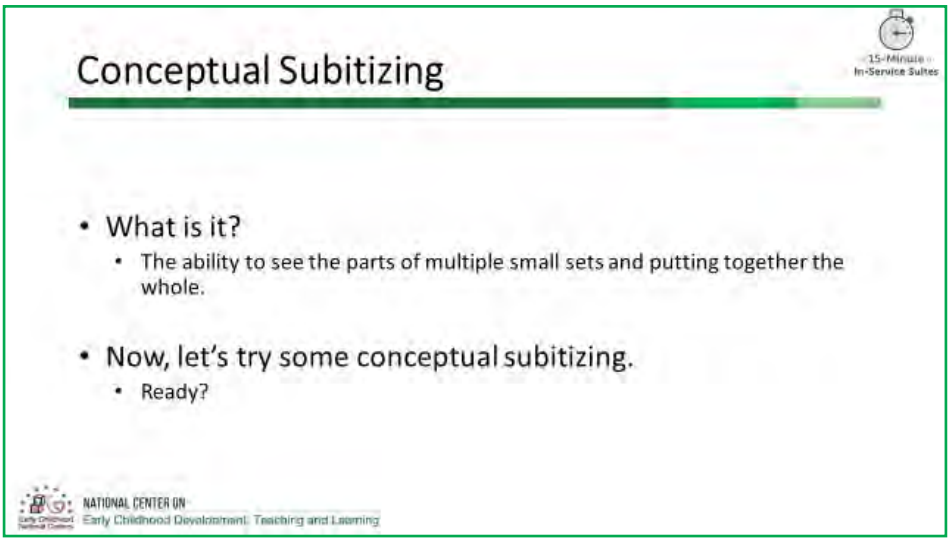

SLIDE 19:

- Conceptual subitizing is the ability to see parts of multiple small sets and put them together.
  - What are the types of images we just viewed? (answer: small sets)
- Now, let's try some conceptual subitizing.
  - Ready? Watch the screen! I will show some blocks for just 2 seconds.

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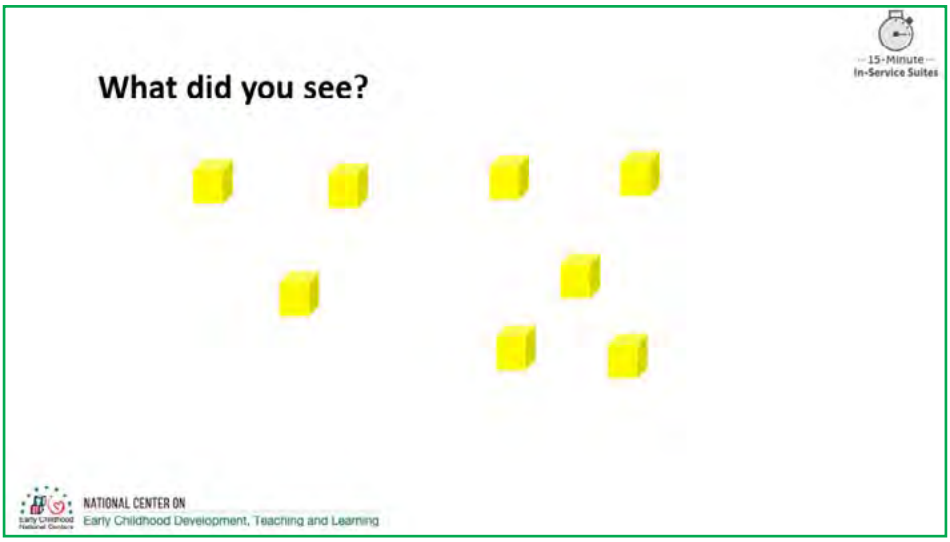

SLIDE 20:

[Let the blocks show and disappear, then advance to the next slide.]

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SLIDE 21:

DISCUSSION: THINK-PAIR-SHARE TO ANSWER THESE QUESTIONS.

What did you see?

How did you know?

Conceptual subitizing builds on perceptual subitizing.

The ability to "see" 8 is conceptual subitizing. Adults "feel" like they see 8, but research shows we really see 3 and 5 and then mentally combine them. That is conceptual subitizing.

Although it is good that so many people have learned from the work of Sarama, Clements, Baroody, and Wheatley about subitizing, many do not know about conceptual subitizing and its importance. Many children can work on conceptual subitizing from 4 years on, and it is important for their mathematical development.

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- Baroody, A. J. 1987. *Children's Mathematical Thinking*. New York, NY: Teachers College.
- Clements, D. H. 1999. "Subitizing: What is it? Why teach it?" *Teaching Children Mathematics 5* (7): 400–405.
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- Wheatley, G. H. 1996. *Quick Draw: Developing Spatial Sense in Mathematics*. Tallahassee, FL: Mathematics Learning.

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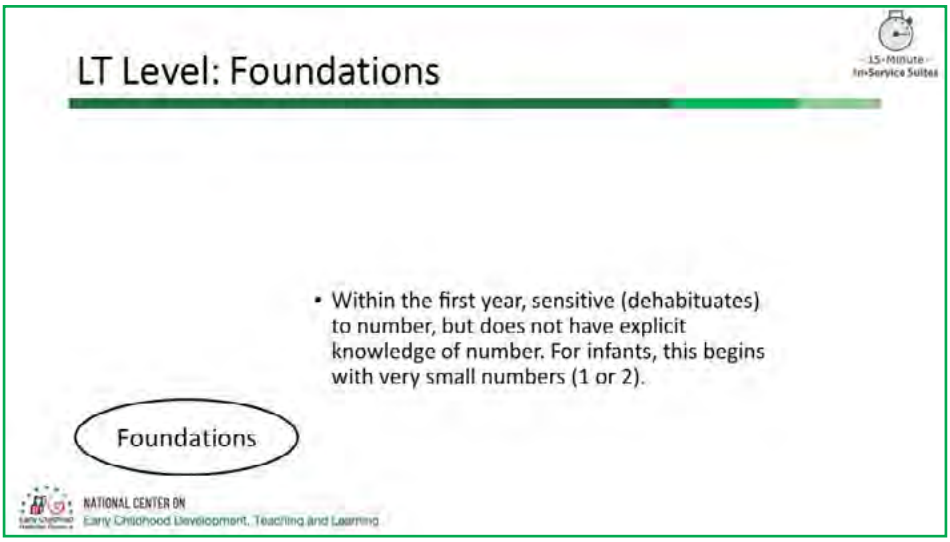

SLIDE 22:

[Go through these next 7 slides very quickly. They simply illustrate levels in the learning trajectory.]

- The first level in the number recognition and subitizing learning trajectory is "Foundations."

[Click]

- Within the first year of life, infants are sensitive to numbers and will dishabituate (get bored and stop looking) when seeing the same repeated numbers. However, they do not know numbers and are not able to correctly identify or recognize them.

MATERIALS NEEDED:

- Tips for Education Staff: Learning Trajectories of Number Recognition and Subitizing
- Insert Optional Slide 5 if you have an internet connection

ADAPTATION FOR HOME VISITORS:

- Tips for Home Visitors: Learning Trajectories of Number Recognition and Subitizing

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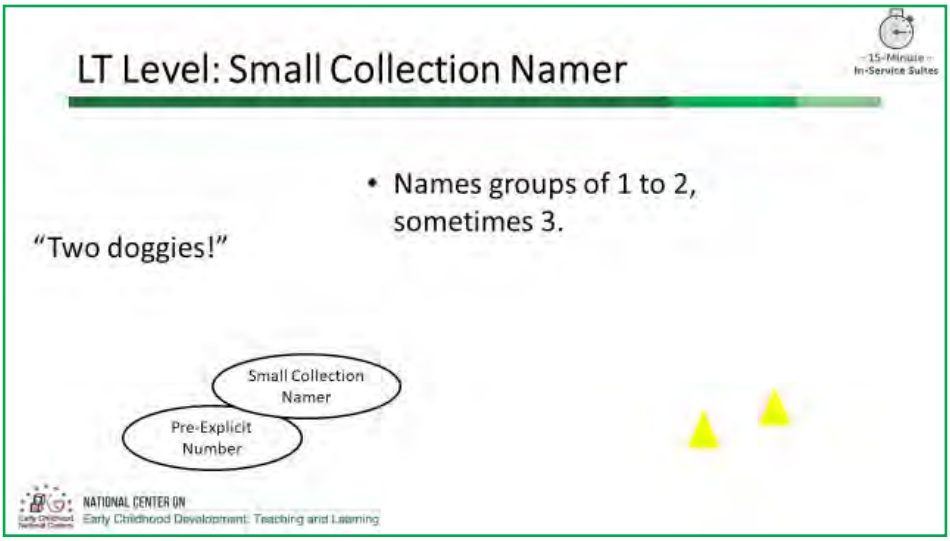

SLIDE 23:

The second level of the learning trajectory is the small collections namer.

[Click]

When shown a group of objects, children at the small collections namer level can *name* groups of 1 to 2, sometimes 3 objects. For example, a toddler may say "2 doggies!"

MATERIALS NEEDED:

- Insert Optional Slide 6

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SLIDE 24:

The third level is maker of small collections.

[Click]

Children at the maker of small collections level can *make,* a small collection of objects that have the same number as another collection of objects or by hearing the name of the number. Usually, they can do this with 1-3, and no more than 4, objects.

MATERIALS NEEDED:

- Insert Optional Slide 7

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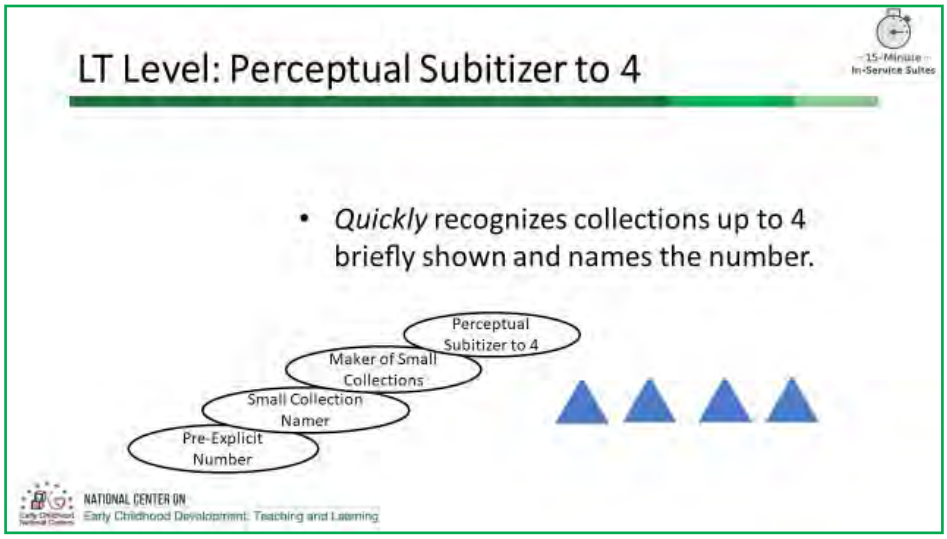

SLIDE 25:

The fourth level is perceptual subitizer to 4.

[Click]

Children at the perceptual subitizer to 4 level can *quickly* recognize small collections of up to 4 objects when briefly shown. They can also name the number without counting objects.

MATERIALS NEEDED:

- Insert Optional Slide 8

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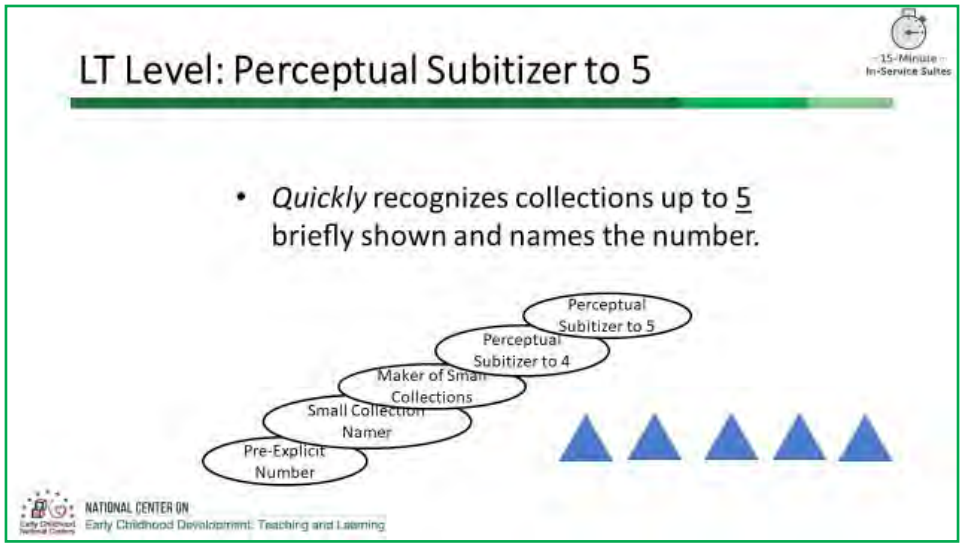

SLIDE 26:

The fifth level is perceptual subitizer to 5.

[Click]

Children at the perceptual subitizer to 5 level can *quickly* recognize small collections of up to 5 objects. They can also name the number without counting objects.

MATERIALS NEEDED:

- Insert Optional Slide 9

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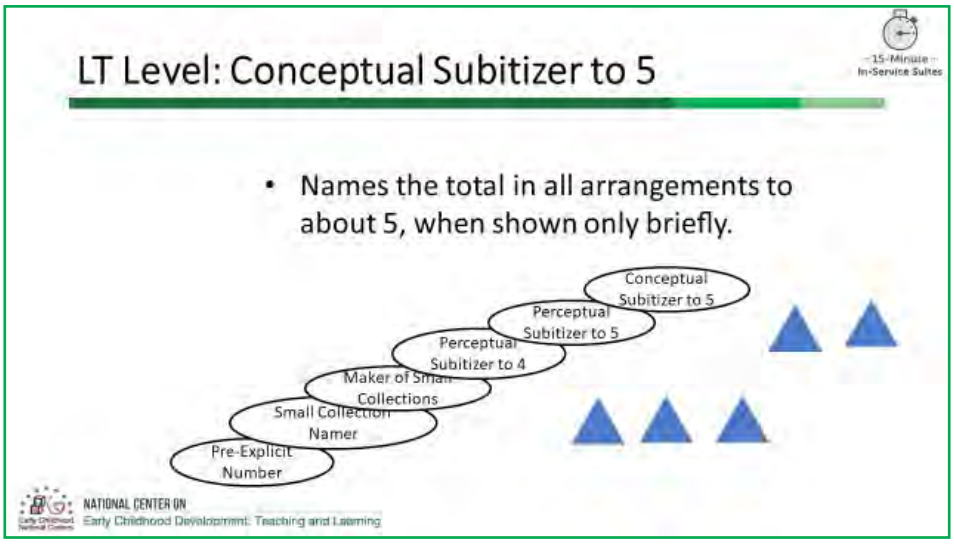

SLIDE 27:

The sixth level is conceptual subitizer to 5.

[Click]

Children at the conceptual subitizer to 5 level can *quickly* name the total of objects, up to 5, in *different arrangements* (such as seeing a group of 2 objects and a groups of 3 objects and knowing that there are 5 total objects). They can also name the number without counting objects.

MATERIALS NEEDED:

- Insert Optional Slide 10

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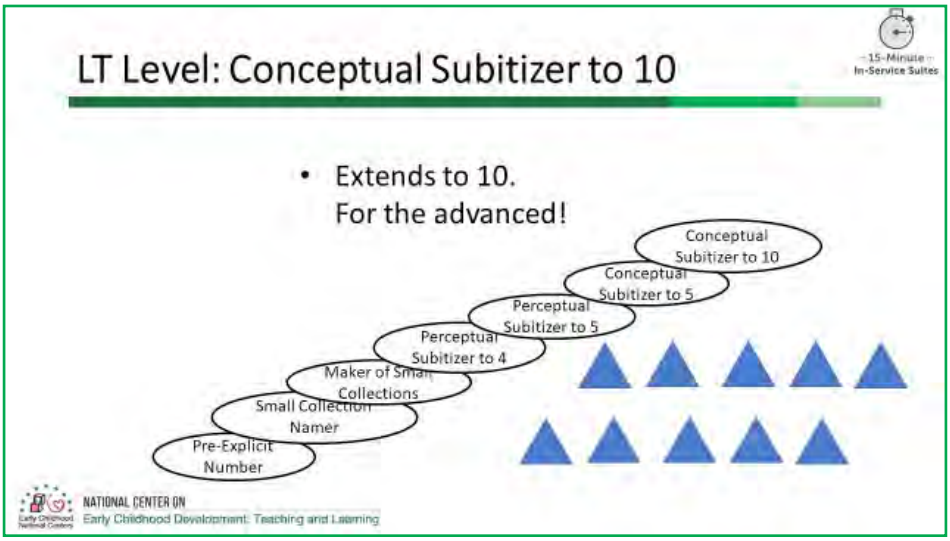

SLIDE 28:

The seventh level is conceptual subitizer to 10.

[Click]

Children at the conceptual subitizer to 10 level can *quickly* name the total of objects, up to 10, using groups. They can also name the number without counting objects.

MATERIALS NEEDED:

- Insert Optional Slide 11

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SLIDE 29:

How can teachers, family child care providers, home visitors, and parents support children's growth of number recognition and subitizing?

Let's start with this: Do we do a good job *now*?

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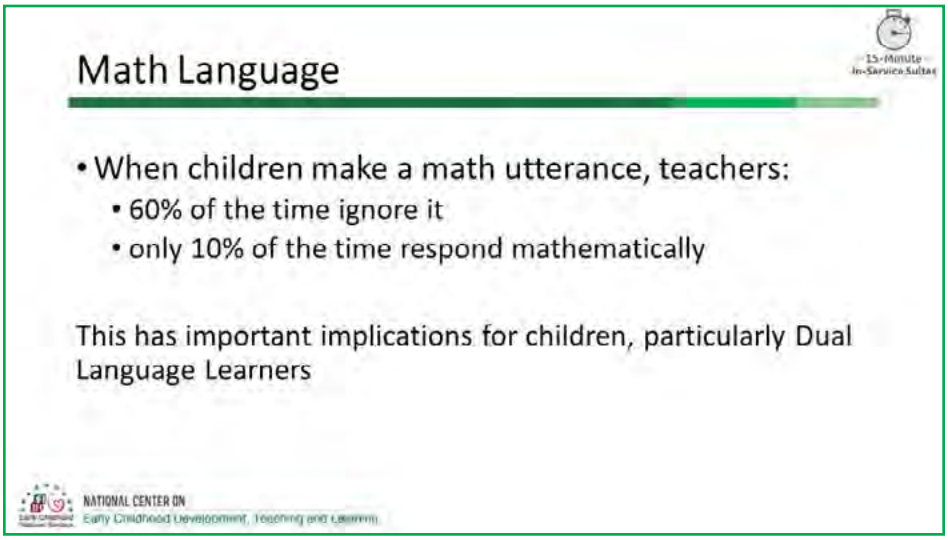

SLIDE 30:

What does research about the way early childhood teachers respond to children speaking about math suggests? What do you think the implications are of this research finding?

REFERENCE

- Diaz, R. M. 2008. "The Role of Language in Early Childhood Mathematics: A Parallel Mixed Method Study." *FIU Electronic Theses and Dissertations.* *https://digitalcommons.fiu.edu/cgi/viewcontent.cgi?referer=https://scholar.google.com/&httpsredir=1&article=4105&context=etd*

ADAPTATION FOR HOME VISITORS:

- Insert HV Optional Slide 8

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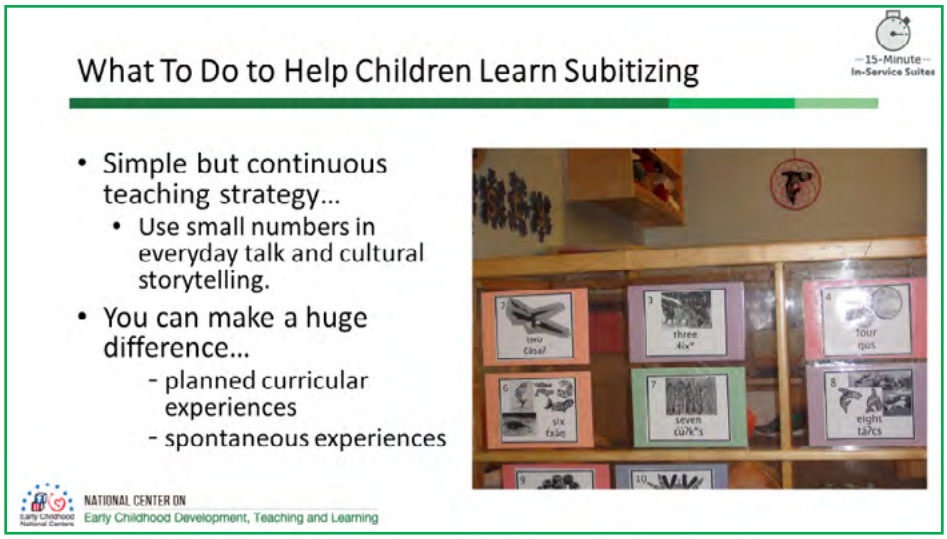

SLIDE 31:

- A simple but continuous teaching strategy makes a huge difference—use small numbers in everyday talk.
- Adults can make huge difference in the spontaneous, informal experiences and interactions that take place between adults and children and between children as they play.
- Here are some examples of everyday talk:
  - As you incorporate traditional foods into your everyday routines (e.g., snack) and activities (e.g., making blue corn tortillas), use number words and have children tell you how many tortillas are on their plate by subitizing.
  - Extend the examples of number recognition and subitizing from the Pilot Study Program Examples for Making It Work; Blue Corn Tortillas *https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/making-it-work-section-03-pilot-program-examples.pdf*
- Here is an example of math talk during storytelling:
  - Support children's number recognition and subitizing skills, even when verbally sharing cultural stories! For example, if you're talking about two stars, hold up two fingers as you narrate that part of the story.
  - Extend the examples to number recognition and subitizing from the Pilot Study Program Examples for Making It Work, Cultural Storytelling *https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/making-it-work-section-03-pilot-program-examples.pdf*

MATERIALS NEEDED:

- Activities for Education Staff: Fantastic Five
- Tips for Education Staff: Supporting Families in Math Learning
- Tips for Families: Help Your Child Learn

ADAPTATION FOR HOME VISITORS:

- Insert HV Optional Slide 9
- Tips for Home Visitors: Supporting Families in Math Learning
- Tips for Families: Help Your Child Learn

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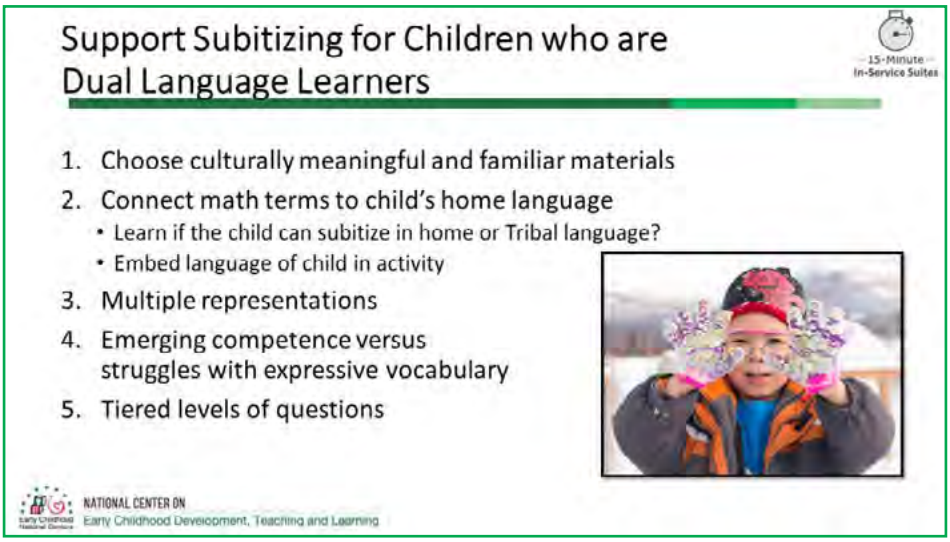

SLIDE 32:

First, remember that children who are dual language learners (DLLs) are still learning and developing a first language. They don't yet know enough of their home language or English to serve as a foundation for future learning, so they need access to what they have learned in both languages when engaging in mathematical conversation and activities (Espinosa, 2013). Children learning a tribal language will benefit from math experiences that represent their language and culture.

1. Choose materials that give children clues what they are supposed to be learning, regardless of how much English they understand. If children in your learning environment are famliar with setting the table for snack or sorting the blocks before they go on the shelf, find ways to incorporate what children already know with something you would like for them to learn. For example, counting out the cups each table needs for snack will eventually help children subitize needed and learn numberical vocabulary. (*https://www.naeyc.org/resources/pubs/tyc/oct2017/make-math-meaningful-diverse-learners*).
2. Connect English or tribal languages to children's first language.
   a. Find out if a child is able to subitize or count in his or her home language. Use the index cards to write down frequently used words that children may speak in their home or tribal languages.
3. Accept multiple representations as responses to tasks—for example, fingers, marks on paper, etc.
4. Speed is an indicator of whether or not a child is able to subitize. However, we know that giving children who are DLLs, the time it takes to respond matters (Cohrssen, Church, & Taylor, 2014; Mauigoa-Tekene, 2006). If possible, try to distinguish between a child who has yet to succeed at the subitizing game versus a child who is struggling to remember the term in English.
5. Consider tiered levels of questions in order to assess child understanding (Krashen & Terrell, 1983; Tabors, 2008).

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a. Non-verbal questions (closed): "Show me… or Point to…"

b. Telegraphic/formulaic (closed): Yes/No, Either/Or

c. Productive (open-ended): "How do you know?" "What is another way to show me X?"

**Keep in mind that when talking about children who are DLLs and children who are learning or developing a tribal languge, it is important know that these two terms have different meanings for each population. For example, tribal programs do not identify themselves as DLLs.

MATERIALS NEEDED:

- Tips for Education Staff: Supporting Children who are Dual Language Learners

ADAPTATION FOR HOME VISITORS:

- Tips for Home Visitors: Supporting Children who are Dual Language Learners

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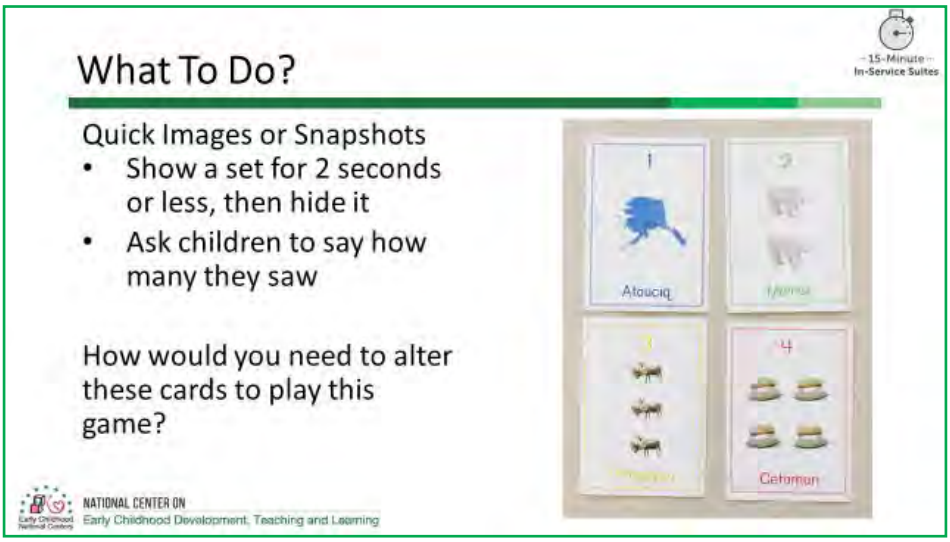

SLIDE 33:

Here's a basic activity called "Snapshots." Show a set for 2 seconds or less, and then hide it. Ask children to tell you how many they saw. Use images that are culturally relevant to children so that they may easily find the words to express what they are seeing. For example, if you use images of words you're practicing in children's tribal language, you can get a "two-for-one" activity—children can practice subitizing *and* hearing tribal names and seeing objects that are culturally relevant to them!

- How would you need to alter these cards to play this game?
  - Remove or hide the numerals (written letters) when you play Snapshots. You can use the cards with both the images and the numerals at another time.

MATERIALS NEEDED:

- Learning Activity for Education Staff: Subitizing Throughout the Day
- Activities for Families: Brainstorming

ADAPTATION FOR HOME VISITORS:

- Learning Activity for Home Visitors: Brainstorming
- Activities for Families: Brainstorming

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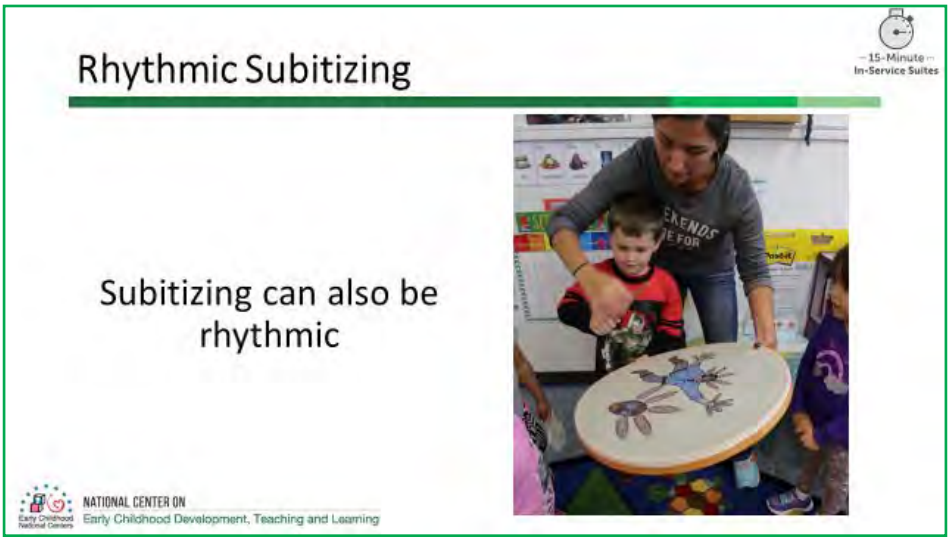

SLIDE 34:

Subitizing can also be rhythmic during singing or music time.

For example, during a classroom Pow Wow, rhythmically beat on the drum for a few beats and have children tell or show you on their fingers how many beats they heard.

Extend the example to number recognition and subitizing from the Pilot Study Program Examples for Making It Work, Pow Wow: *https://eclkc.ohs.acf.hhs.gov/sites/default/files/pdf/making-it-work-section-03-pilot-program-examples.pdf*.

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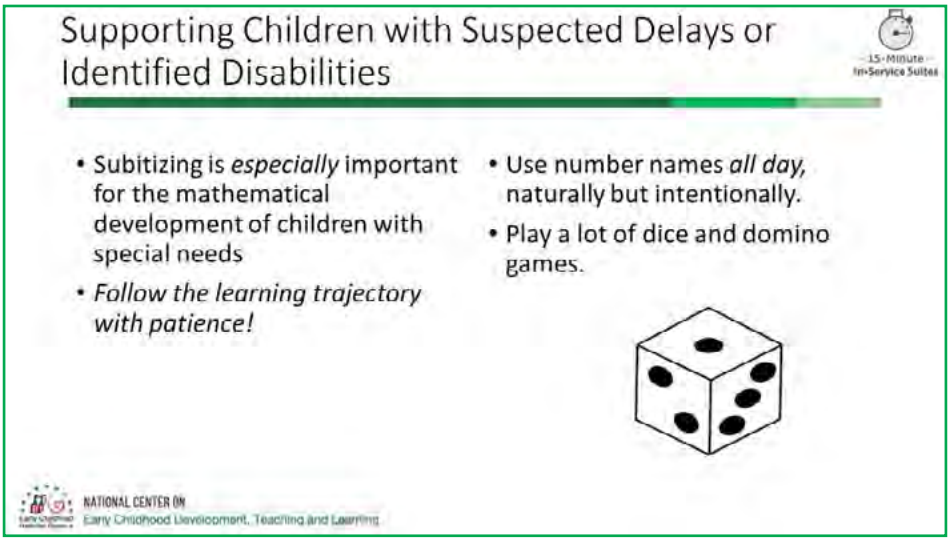

SLIDE 35:

Given it's foundational and critical role in children's initial number sense development, it is *especially* important for children who may have suspected delays or identified disabilities (Baroody, 1986).

Following the learning trajectory (described in the ELOF and here in the PPT) back to the beginning if necessary, with informal and intentional experiences over an *extended time*, is critical. Using small (and slowly increasing) numbers in everyday talk and storytelling is particularly important in informal experiences. Simply saying, "You ate *three* pretzels!" and so forth, throughout the day, does not take away time from anything else, and is a golden opportunity to help all children develop a sense of numbers. Dice, domino, and board games that use die are fun, simple examples of intentional experiences that research says helps children build number sense in a variety of ways.

REFERENCES

- Clements, D. H., J. Sarama, & B. L. MacDonald. 2017. "Subitizing: The Neglected Quantifier." In N. Anderson & M. W. Alibali (Eds.), *Constructing Number: Merging Perspectives from Psychology and Mathematics Education*. Gateway East, Singapore: Springer.
- Funkhouser, C. 1995. "Developing Number Sense and Basic Computational Skills in Students with Special Needs." *School Science and Mathematics* 95 (5): 236-239.

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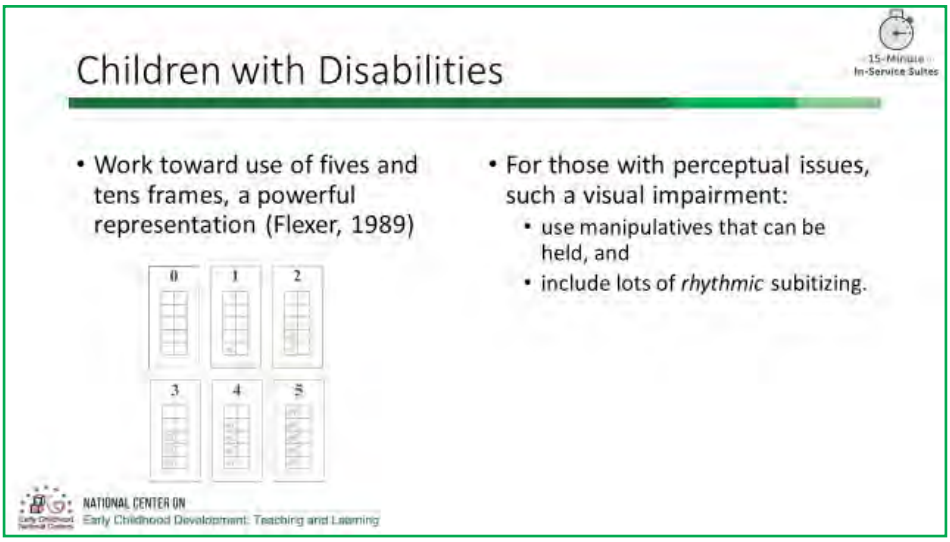

SLIDE 36:

Researchers who work with typically and atypically developing children promote the use of the five and ten frame. Organizing the dots on the grids (seen here) provides a simple visual image that children can associate with each number—supporting perceptual subitizing development. These mental images also help children as they learn to partition small numbers into different combinations. For example: 0+5=5, 1+4=5, 2+3=5, and so forth. When they can do this quickly, this is *conceptual* subitizing.

The five and ten frame can and should be available to children with perceptual delays. If children are visually impaired, use manipulatives they can hold—such as beads or whiffle balls on a string, or Legos or use rhythmic subitizing.

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- Clements, D. H., & J. Sarama. 2014. *Learning and Teaching Early Math: The Learning Trajectories Approach* (2nd ed.). New York, NY: Routledge.
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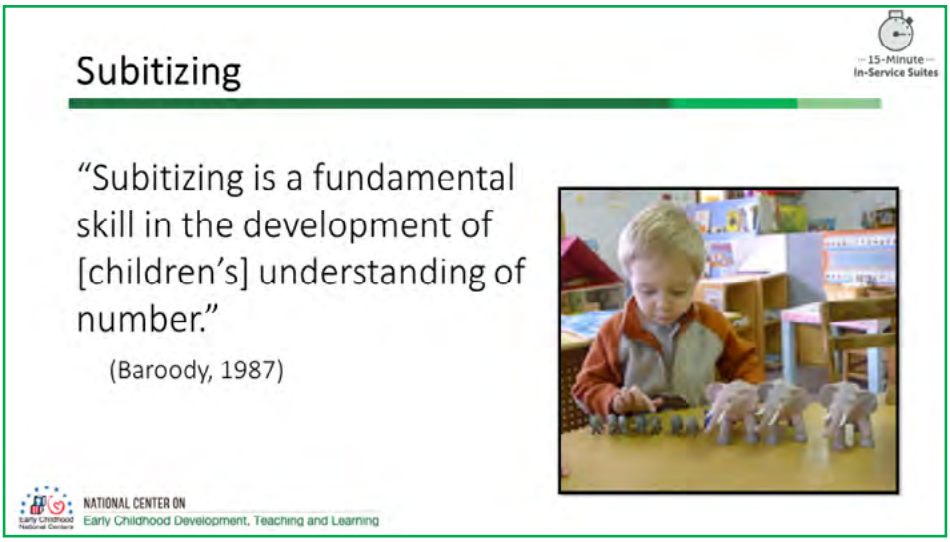

SLIDE 37:

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

REFERENCE:

- Baroody, A. J. 1987. *Children's Mathematical Thinking*. New York, NY: Teachers College.
- Clements, D. H., J. Sarama, & B. L. MacDonald. 2017. "Subitizing: The Neglected Quantifier." In N. Anderson & M. W. Alibali (Eds.), *Constructing Number: Merging Perspectives from Psychology and Mathematics Education*. Gateway East, Singapore: Springer.
- Funkhouser, C. 1995. "Developing Number Sense and Basic Computational Skills in Students with Special Needs." *School Science and Mathematics* 95 (5): 236-239.

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SLIDE 38:

- Number recognition is the earliest developing number sense. Support children as they learn how to count and eventually working out math problems.
- Subitizing is the rapid recognition of numbers without needing to count.
- Perceptual subsidization begins in infancy. As children get older, they can conceptually subitize—recognize the total amount of objects in different grouping—without counting!
- When teachers, home visitors, and parents use small numbers in everyday language, this helps support children's number recognition and subitizing.
- Work with families in both center- and home-based settings to encourage math learning at home.
- To support children who are dual langue learners, provide multiple representations of numbers to help build their understanding.
- Embed the child's home language into math activities to increase their understanding of number recognition and subitizing.
- Math is a part of a child's everyday environment. Allow them to explore and be there to intentionally support their math development.

MATERIALS NEEDED:

- Helpful Resources
- Tools for Supervisors and Coaches: Number Recognition and Subitizing
- Insert Optional Slide 12
- Insert Optional Slide 13

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