



# DIFFERENTIATING LEARNING OPPORTUNITIES IN EARLY MATH

## PRESENTER NOTES

This guide walks you through presenting the Differentiating Learning Opportunities in Early Math 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). Learning activities, tip sheets, and activity sheets are labeled for their intended audiences.

### MATERIALS NEEDED

- Projector and audio equipment
- Flip chart or similar large paper
- Markers for writing participant ideas
- Internet connection to show video examples
- Tip sheets

### BEFORE YOU BEGIN

- This presentation provides an explanation of differentiating learning opportunities in early math and outlines how to use formative assessment along with a developmental progression to inform their teaching practices. This suite is for education staff working with children birth to age five, with an emphasis on the preschool years.
- In the presentation, you will:
  - Describe the importance of differentiating learning opportunities in early math
  - Provide ways to use differentiation along a developmental progression to inform teaching
  - Give examples of differentiated learning opportunities based on developmental progressions
- The presentation includes video clips that illustrate teachers differentiating math instruction. Although most of the videos are teacher examples, home visitors can watch the strategies and use them for their own professional development and encourage families to replicate.
- Learning activities offer participants opportunities to understand how to differentiate math instruction.
- Adaptation boxes are labeled throughout the presentation to individualize this training for your specific training group.

### LIST OF AVAILABLE CONTENT

#### HANDOUTS

- Tips for Education Staff: Responding to Counting Errors
- Tips for Families: Responding to Counting Mistakes
- Tips for Home Visitors: Helping Families Respond to Counting Mistakes
- Tools for Center-Based Supervisors: Differentiation and Responding to Errors
- Tools for Home-Based Supervisors: Differentiation and Responding to Errors
- Helpful Resources

OPTIONAL SLIDES

- Optional Slides 1: Further Examples of Differentiating
- Optional Slide 2: Number Sayer
- Optional Slide 3: Chanter
- Optional Slide 4: Reciter
- Optional Slide 5: Corresponder
- Optional Slide 6: Counter/Producer
- Optional Slide 7: Counter & Producer
- Optional Slide 8: LT2: A Counting Example
- Optional Slides 9: Differentiating Teaching
- Optional Slide 10: Supporting Teaching and Learning
- Optional Slide 11: Small Groups
- Optional Slide 12: Free Explore with Observation
- Optional Slide 13: Making Number Pizza
- Optional Slide 14: Assessment for Making Number Pizza
- Optional Slide 15: Formative Planning for Board Game
- Optional Slide 16: At the Same Time
- Optional Slide 17: LT2: An Instructional Example

OPTIONAL HANDOUTS

- Learning Activity for Education Staff: Ongoing Assessment
- Learning Activity for Home Visitors: Ongoing Assessment

PRESENTATION OUTLINE

SLIDE	HANDOUTS NEEDED	HOME VISITOR HANDOUTS	OPTIONAL SLIDES & HANDOUTS
1. Differentiating Learning Opportunities in Early Math			
2. Framework for Effective Practice			
3. Framework for Effective Practice: Pillars			
4. Framework for Effective Practice: Roof			
5. Framework for Effective Practice: Foundation			
6. Early Math Found in the ELOF			
7. Objectives			



SLIDE	HANDOUTS NEEDED	HOME VISITOR HANDOUTS	OPTIONAL SLIDES & HANDOUTS
8. What Is Differentiation?			
9. Differentiating in Early Math			
10. Why Differentiate?			
11. How Well Are Education Staff Supported?			
12. Differentiation Develops Multiple Abilities			
13. Differentiation Starts Early			
14. Differentiation: A Deeper Dive			
15: Learning Trajectories			
16. Learning Trajectory's 3 Parts			
17. Differentiation's Key Questions			
18. LT Goal: Where Are We Trying to Go?			
19. Developmental Progression and Assessment: Where Are We Now?			<ul style="list-style-type: none"> <li>▪ Optional Slides 1-7</li> <li>▪ Learning Activity for ES: Ongoing Assessment</li> <li>▪ Learning Activity for HV: Ongoing Assessment</li> </ul>
20. Counting: A Brief Example			<ul style="list-style-type: none"> <li>▪ Optional Slide 8</li> </ul>
21. Developmental Progression: Where Are We Now?			
22. LT's Teaching Practices: How Do We Get There?			<ul style="list-style-type: none"> <li>▪ Optional Slides 9-16</li> </ul>
23. Improving Feedback			
24. Feedback for Specific Errors			
25. Should We Always Correct Errors?	<ul style="list-style-type: none"> <li>▪ Tips for ES: Responding to Counting Errors</li> <li>▪ Tips for Families: Responding to Counting Mistakes</li> </ul>	<ul style="list-style-type: none"> <li>▪ Tips for HV: Helping Families Respond to Counting Mistakes</li> <li>▪ Tips for Families: Responding to Counting Mistakes</li> </ul>	
26. See...			

SLIDE	HANDOUTS NEEDED	HOME VISITOR HANDOUTS	OPTIONAL SLIDES & HANDOUTS
27. Differentiation with Children Who Are Dual Language Learners			
28. Dual Language and Tribal Language Learners			
29. Supporting Dual Language Learners & English Learners in Early Math			
30. Differentiated Instruction Benefits All Children			
31. Review	<ul style="list-style-type: none"> <li>▪ Helpful Resources</li> <li>▪ Tools for CB Supervisors</li> <li>▪ Tools for HB Supervisors</li> </ul>		
32. LT2: Learning and Teaching with Learning Trajectories			<ul style="list-style-type: none"> <li>▪ Optional Slide 17</li> </ul>

ES: Tips/learning activities for education staff

F: Tips/learning activities for families

HV: Tips/learning activities for home visitors



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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.

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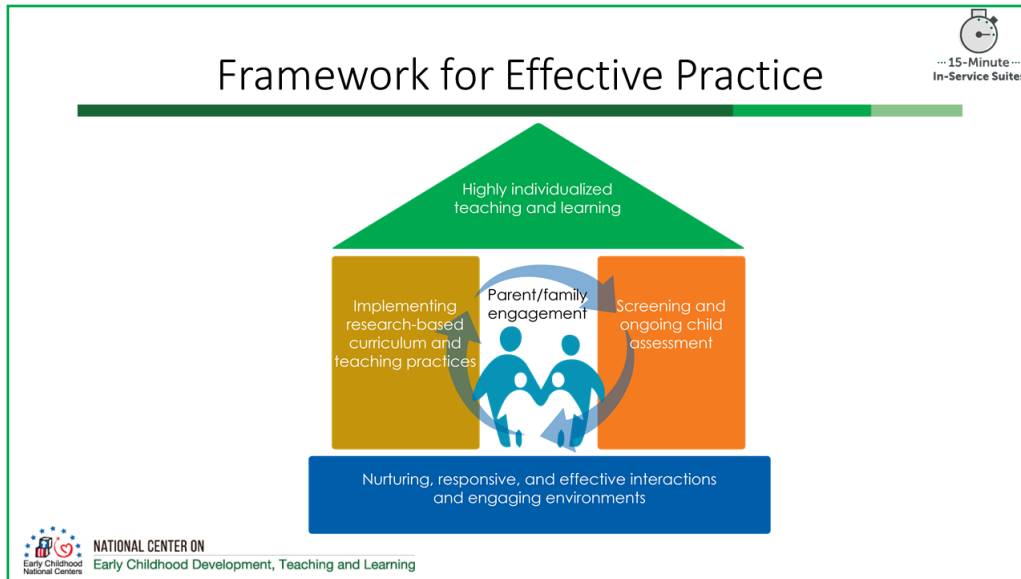
## REFERENCES:

Clements, D. H., & J. Sarama. 2014. *Learning and Teaching Early Math: The Learning Trajectories Approach*. New York, NY: Routledge.

National Mathematics Advisory Panel. 2008. *Foundations for Success: The Final Report of the National Mathematics Advisory Panel*. Washington DC: U.S. Department of Education, Office of Planning, Evaluation, and Policy Development.

Sarama, J., & D. H. Clements. 2009. *Early Childhood Mathematics Education Research: Learning Trajectories for Young Children*. New York, NY: Routledge.

Shepard, L., & J. W. Pellegrino. 2018. "Classroom Assessment Principles to Support Learning and Avoid the Harms of Testing." *Educational Measurement: Issues and Practice* 37(1): 52–57.



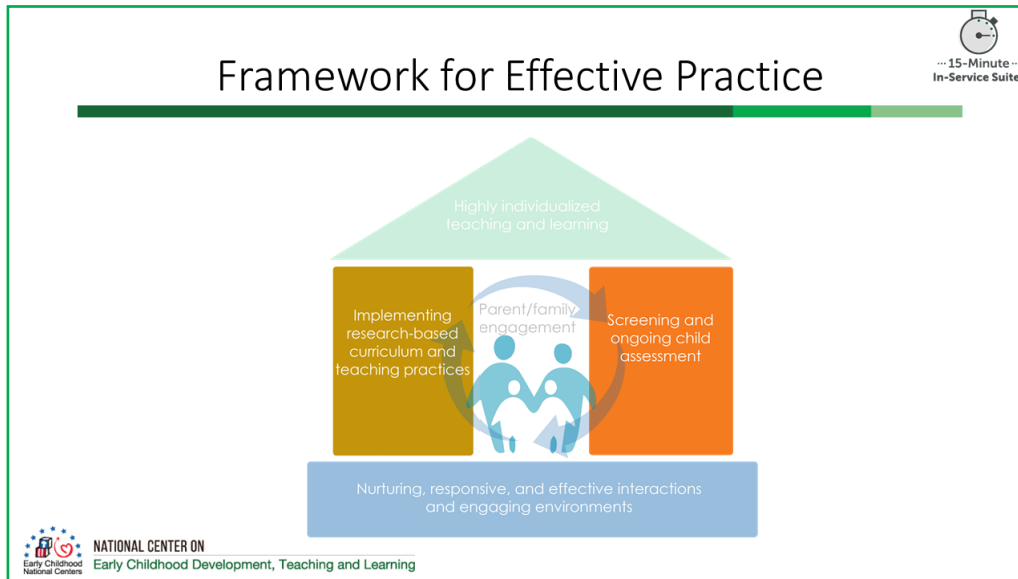
## SLIDE 2:

Read the following:

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: Using screening and ongoing assessment
- The roof: Individualizing teaching and learning
- The center: Engaging parents and families

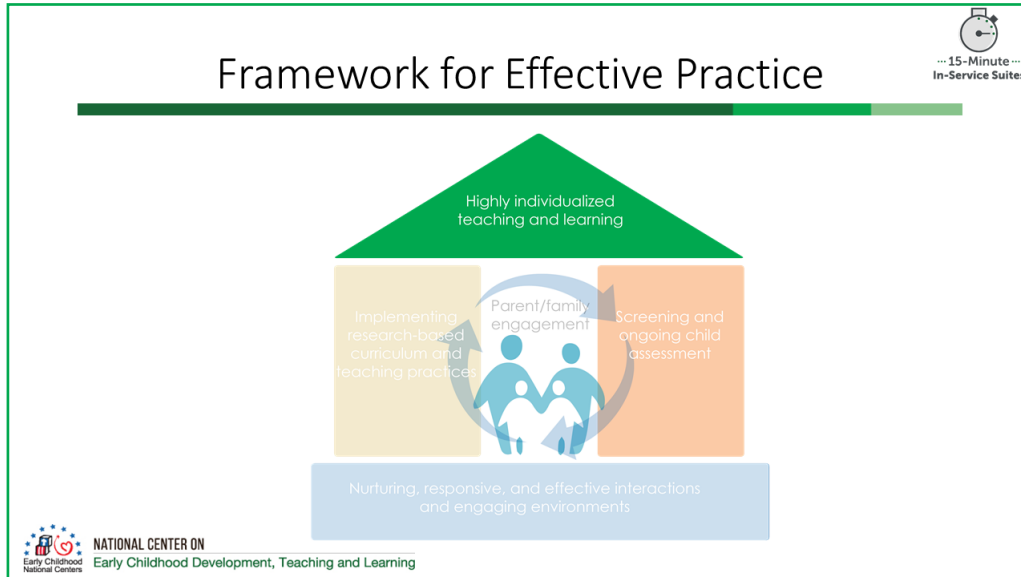
When connected with one another, they form a single structure—the House Framework—that surrounds the family in the center. As we implement each component of the house—in partnership with parents and families—we foster children’s learning and development.



## SLIDE 3:

Read the following:

- This 15-minute in-service suite helps us think about the two pillars of the house.
- The right pillar is conducting ongoing assessment to determine what children already know about mathematics.
- And the left pillar helps education staff implement research-based curriculum and teaching practices based on what they have learned from the child's screening and ongoing assessments.

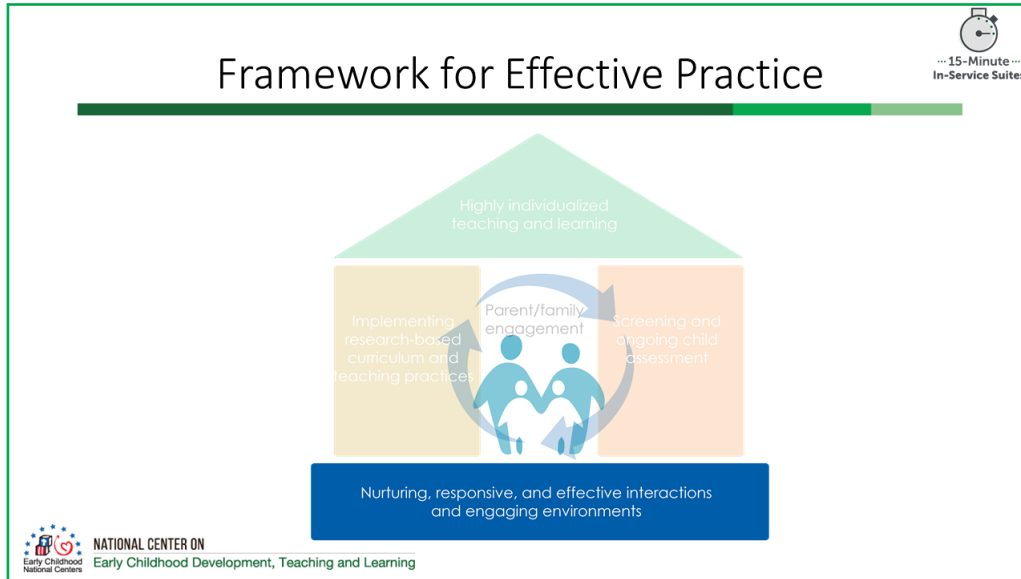


## SLIDE 4:

Read the following:

- The roof of the house represents highly individualized teaching and learning, which are the strategies and supports all children need in order to learn. Teachers use ongoing assessment information to inform their curriculum planning, which includes intentional learning opportunities and interactions.





## SLIDE 5:

Read the following:

- This 15-minute in-service suite also helps us think about the foundation of the House. Differentiating learning opportunities happen casually during interactions with children throughout the day in engaging environments.

# Early Math Found in the ELOF

... 15-Minute ...  
In-Service Suites

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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## SLIDE 6:

Read the following:

The Head Start Early Learning Outcomes Framework (ELOF) helps teachers, family child care providers, and home visitors understand child development and what children should know and be able to do. The ELOF guides the implementation of 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 math, they develop skills in multiple ELOF domains, including Approaches to Learning and Cognition. For infants and toddlers, early math skills and concepts 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.

Another area of development connected to math learning is Approaches to Learning. This domain is about how children learn, rather than what they learn. It includes crucial executive function skills, like cognitive self-regulation. Children are born primed to explore number ideas as they learn about the world. The ELOF helps adults understand where children are in their development and where they should go next.

## Objectives



- Describe the importance of differentiating learning opportunities in early math.
- Provide ways to use differentiation along a *developmental progression* to inform teaching.
- Give examples of differentiated learning opportunities based on developmental progressions.

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### SLIDE 7:

Read the following:

In this session we will:

- Describe the importance of differentiating learning opportunities in early math.
- Provide ways to use differentiation along a developmental progression to inform teaching.
- Give examples of differentiated learning opportunities based on developmental progressions.

## What Is Differentiation?



- Differentiation is the **ongoing assessment** of children’s learning to design beneficial learning opportunities.
- Differentiation involves evaluating children’s learning in the moment it occurs—in informal discussions, in observations of natural play, or in small group activities.
- And then *creating learning opportunities* based on what staff learn.

### SLIDE 8:

Read the following:

- What is differentiation and how can we use it in the early years?
- [Click] Differentiation is the ongoing assessment of children’s learning to inform instruction. During observation, they identify what a child knows—in informal discussions, in observation of natural play, on the playground, in small group activities, and so forth. Home visitors can also encourage parents to observe their child during daily routines and activities to get a better sense of what their child knows.
- [Click] Teachers and family child care providers can adjust their interactions and activities to build feedback loops. This helps them build on what a child knows and supports new learning at just the right time and just the right point. Home visitors can support parents as they provide feedback to their child and adjust their interactions and activities to meet their child’s needs.
- [Click] Teachers and family child care providers can observe the class as a whole—are they with me?—and individual children within it.

## Differentiating in Early Math



- Differentiating requires staff learn about children’s thinking, then create or modify the environment and interactions based on what they have learned.
- Differentiating learning opportunities are key to effective early math education at *all ages*.
- For mathematics, learning new concepts depends on learning previous ones well.

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### SLIDE 9:

Read the first bullet.

Read the following:

- [Click] Many studies agree that assessment and individualization are key to effective early math education.
- [Click] Mathematics is more sequential and hierarchic than other domains—that is, learning new concepts depends critically on learning previous ones well.

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### REFERENCES:

Clements, D. H., & J. Sarama. 2014. *Learning and Teaching Early Math: The Learning Trajectories Approach*. New York, NY: Routledge.

National Research Council. 2009. *Mathematics Learning in Early Childhood: Paths Toward Excellence and Equity*. Washington, DC: National Academy Press. doi:10.17226/12519.

Thomson, S., K. Rowe, C. Underwood, & R. Peck. 2005. Numeracy in the Early Years: Project Good Start. Retrieved from Australian Council for Educational Research website:  
[http://www.acer.edu.au/documents/GOODSTART\\_FinalReport.pdf](http://www.acer.edu.au/documents/GOODSTART_FinalReport.pdf)

# Why Differentiate?



- Teachers underestimated “high attainers” 41% of the time.
  - These children only got repetitious *practice*.
  - They did not learn new concepts and skills.
- Teachers overestimated “low attainers” 44% of the time.
  - Teachers didn’t “move back” to develop ideas and skills students had not yet learned.
  - Most of the time, teachers just moved to next set of tasks.
- The most successful teacher spent the most time with small groups, assessing children's level of thinking through discussion.

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## SLIDE 10:

Read the following:

- Why should we use interactions and teaching strategies to differentiate learning opportunities?
- Come with me to visit classes of slightly older school children in England. Researchers assessed children, then studied their teachers’ instructions. They documented what the children knew before the teachers taught.

[Click] Read the first main bullet and sub-bullets and elaborate as you wish. Explain that “high attainers” are the children in the study who performed above their suggested developmental level.

[Click] Read the second main bullet and sub-bullets and elaborate as you wish. Explain that “low attainers” are the children in the study who performed below their suggested developmental level.

[Click] Read the third main bullet.

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## REFERENCE:

\*Note: This study was based on a sample of 6- to 7-year-old children in Britain.

Bennett, Neville, Charles Desforges, Anne Cockburn, and Betty Wilkinson. 1984. *The Quality of Pupil Learning Experiences*. Hillsdale, NJ: Erlbaum.

## How Well Are Education Staff Supported?



- When we hear the results of that and other studies, we wonder:
  - How many teachers received professional development in math?
  - How do teachers learn about the different developmental levels of thinking?

### SLIDE 11:

Read the following:

- This is not a criticism of these or any teachers. It is merely research to help us all learn and improve. Many teachers and family child care providers do not receive any preservice or in-service training in mathematics education. Even those that do get limited support and almost none learn about levels of thinking (IOM [Institute of Medicine] and NRC [National Research Council], 2012).
- The National Mathematics Advisory Panel (NMAP) also concluded that differentiation was far more useful when teachers had support and knew what to do with the information the assessment offered.
- So, it would be easier for programs to use differentiation than adopting a new program (Black & Wiliam, 1998; Penuel & Shepard, 2016; Shepard, 2005).

### REFERENCES:

IOM (Institute of Medicine) and NRC (National Research Council). 2012. *The Early Childhood Care and Education Workforce: Challenges and Opportunities: A Workshop Report*. Washington, DC: The National Academies Press.

Black, P., & D. Wiliam. 1998. "Inside the black box: Raising standards through classroom assessment." *Phi Delta Kappan*, 139–148.

Komara, C., & J. Herron. 2012. "Implementing Formative Mathematics Assessments in Prekindergarten." *Childhood Education* 88(3): 162–168. doi:10.1080/00094056.2012.682548.

National Mathematics Advisory Panel. 2008. "Foundations for Success: The Final Report of the National Mathematics Advisory Panel." Washington DC: U.S. Department of Education, Office of Planning, Evaluation and Policy Development.


Penuel, W. R., & L. A. Shepard. 2016. "Assessment and Teaching." In D. H. Gitomer & C. A. Bell (Eds.), *Handbook of Research on Teaching* (5th ed., pp. 787–850). Washington, DC: American Educational Research Association. doi: 10.3102/978-0-935302-48-6\_12.

Shepard, L. A. 2005. "Assessment." In L. Darling-Hammond & J. Bransford (Eds.), *Preparing Teachers for a Changing World* (pp. 275–326). San Francisco, CA: Jossey-Bass.

## Differentiation Develops Multiple Abilities

- Children who enter school with fewer math skills benefit the most from differentiated learning opportunities.
  - Differentiation helps children develop self-regulation skills.

	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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### SLIDE 12:

Read the following:

- Importantly, differentiation helps all children learn. It also helps children who enter with fewer math skills (outlined in the ELOF—Cognition domain) the most. They also gain the higher-order (metacognitive) skills, such as self-regulation and executive functioning (outlined in the ELOF—Approaches to Learning domain), that children with great math skills have already attained.

### REFERENCES:

Clements, D. H., & J. Sarama. 2014. *Learning and Teaching Early Math: The Learning Trajectories Approach*. New York, NY: Routledge.

Thomson, S., K. Rowe, C. Underwood, & R. Peck. 2005. "Numeracy in the Early Years: Project Good Start." Retrieved from [http://www.acer.edu.au/documents/GOODSTART\\_FinalReport.pdf](http://www.acer.edu.au/documents/GOODSTART_FinalReport.pdf)



## Differentiation Starts Early



- How about infants and toddlers?
  - Although interactions are different, a *developmental perspective* is key.
- Equity concerns start early!

### SLIDE 13:

Read the bullets and elaborate as you wish.

- Done right, formative assessment is appropriate for children of all ages, including infants and toddlers.
- When designing differentiated learning opportunities for infants and toddlers, it will be important to tailor interactions to fit their needs. It will also be equally important to understand where infants and toddlers are developmentally before designing learning opportunities in order to build on what the child knows.
- Equity concerns start early!
  - Some children hear about 1,500 number words each year. But others hear 93,000 (Levine et al., 2010)! That's about 60 times as many every year from birth!
- Therefore, teachers, family child care providers, and home visitors can play a key role in helping families to embed math vocabulary and experiences throughout their day—naturally and as part of their routines and activities.

### REFERENCES:

Jordan, N. C., & S. C. Levine. 2009. "Socioeconomic Variation, Number Competence, and Mathematics Learning Difficulties in Young Children." *Developmental Disabilities Research Reviews*, 15: 60–68.

Levine, S. C., L. W. Suriyakham, M. L. Rowe, J. Huttenlocher, & E. A. Gunderson. 2010. "What Counts in the Development of Young Children's Number Knowledge?" *Developmental Psychology*, 46(5): 1309–1319. doi: 10.1037/a0019671.

## Differentiation: A Deeper Dive



- Remember, differentiation is the use of ongoing assessment information about children’s learning to design learning opportunities.
- Differentiation involves identifying what a child knows as it occurs—in informal discussions, in observation of natural play, or in small groups.
- Education staff assess children's learning for the whole class and individual children.
- Education staff build feedback loops to adjust their interactions and activities. They build on what a child knows, including everyday environments, routines, activities, and intentional instruction.

### SLIDE 14:

Read the following:

- What is differentiation and how can we use it in the early years?
- [Click] Differentiation is the ongoing monitoring of children’s learning to inform instruction. And we are evaluating what a child knows at the moment they exhibit it, in informal discussions, in observation of natural play, on the playground, in small group activities, and so forth.
- [Click] Staff might monitor the whole class—are they with me?—and individual children.
- [Click] Teachers and family child care providers can build feedback loops to adjust their interactions and activities. These adjustments build on what a child knows and supports new learning at just the right time and just the right point. Home visitors can model this during their home visits or socializations and provide prompts and suggestions for families to do the same.

# Learning Trajectories

... 15-Minute ...  
In-Service Suites

- We need a path.
- Adults who help children progress toward their math goals don't see themselves as "doing math" or "covering a curriculum," but as helping children move through a learning trajectory....



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## SLIDE 15:

Read the following:

- So, *how* do you track children's progress in mathematics? How do you know where the children are and where should they go next?
- This is particularly important because, as we saw, math is more sequential than other domains and learning new ideas depends on learning previous ones well (Clements & Sarama, 2014; National Research Council, 2009; Thomson, Rowe, Underwood, & Peck, 2005).
- Education staff and home visitors who help families meet their goals for children's learning don't just see themselves as "doing math" or "covering a curriculum," but as helping children move through a learning trajectory.
- So, we need a path for planning environments, experiences, and interactions with children. We need a learning trajectory.

## REFERENCES:

Clements, D. H., & J. Sarama. 2014. *Learning and Teaching Early Math: The Learning Trajectories Approach*. New York, NY: Routledge.

National Research Council. 2009. *Mathematics Learning in Early Childhood: Paths Toward Excellence and Equity*. Washington, DC: National Academy Press. doi:10.17226/12519.

Thomson, S., K. Rowe, C. Underwood, & R. Peck. 2005. "Numeracy in the Early Years: Project Good Start." Retrieved from [http://www.acer.edu.au/documents/GOODSTART\\_FinalReport.pdf](http://www.acer.edu.au/documents/GOODSTART_FinalReport.pdf)

## Learning Trajectory's 3 Parts

... 15-Minute ...  
In-Service Suites

- Goal
- Developmental progression
- Teaching practices: Environments, routines, and intentional activities

### SLIDE 16:

Read the following:

- For the next few slides we introduce concepts and ideas from the Learning Trajectories website. This website includes over 1000 videos, instructional activities, and computer games across multiple math categories. And registration is free! LT2 is a web-based tool to help early childhood educators think about how children learn about mathematics. It shows staff how to teach mathematics to young children (birth to age 8). The website provides teachers with information about learning trajectories for math.
- Users can access hundreds of classroom activity ideas to support children's development along the math trajectories.
  - Education staff can also review short video clips of children's thinking, along the math learning trajectories, right on the ECLKC. Just search for Math Learning Trajectories. The link is <https://eclkc.ohs.acf.hhs.gov/school-readiness/article/math-learning-trajectories>.
  - Home visitors may be able to modify the classroom teaching practices for parents. Home visitors can support parents as they set up the home environment, establish routines, and do activities with their child that promote mathematical development.
- "Learning trajectories have three parts. To attain a particular mathematical competence (the goal), children learn each level (the developmental progression), aided by teaching practices such as environments, routines, and intentional activities. Staff design these teaching practices to enable thinking at each higher level (Clements & Sarama, 2014).
- The developmental progressions found in the learning trajectories are more detailed than the ELOF, although many of the goals are the same. Note that the ELOF's developmental progressions are a summary form of the more detailed learning trajectories research has produced.

### REFERENCE:

Clements, D. H., & J. Sarama. 2014. *Learning and Teaching Early Math: The Learning Trajectories Approach*. New York, NY: Routledge.

## Differentiation's Key Questions



- Where are we trying to go?      LT goal
- Where are we now?              LT's developmental progression—where are children *now* and what are *next levels*?
- How can we get there?          LT teaching practices—environment, routines, and intentional activities

### SLIDE 17:

Read:

- Why are learning trajectories so helpful? Let's first examine the three key questions education staff or home visitors must ask and answer to differentiate learning opportunities.
- [Click] Where are we trying to go?
- [Click] Where are we now?
- [Click] How can we get there?
- Well, learning trajectories' three parts answer these three questions! Consider...
  - Where are we trying to go?
- [Click] That's the learning trajectory's goal (often similar to or the same as ELOF goals).
- [Click] Where are we now? You can figure that out using the learning trajectory's developmental progression—you will know where children are now and what next levels you want them to reach.
- [Click] How can we get there?
- That's the learning trajectory's environments, activities, and teaching strategies!

## LT Goal: Where Are We Trying to Go?



- Beyond “rote” counting.
- Goal is accurate, fluent, confident:
  - verbal counting
  - object counting
  - counting strategies
- Counting is the *key to all future number knowledge* as well as the *first and most basic mathematical algorithm*.

### SLIDE 18:

Read the following:

- A goal for counting goes beyond simple rote counting.
- Some examples of goals for one child could be to count accurately, confidently, fluently, and verbally, object counting, and using counting strategies to solve problems.
- Remember that counting is the key to all future knowledge and that it is the first and most basic algorithm every child can learn.

**Note:** An algorithm is a process or set of steps one follows in calculations, such as multi-digit addition, or other problem-solving operations.

## Developmental Progression and Assessment: Where Are We Now?



- Ongoing assessment is best conducted *during* interactions intended to improve teaching and learning.
- This is sometimes called “curriculum-embedded assessment” or simply teacher observation and documentation during interactions with children.
- Its usefulness depends on knowing the developmental progression—the path of learning and teaching.

### SLIDE 19:

- Say, “Let’s consider the assessment component.”

Read bullets

- Remind participants that the path (developmental progression) is like the ELOF’s levels, but often more specific to aid teaching and learning.
- Home visitors can also encourage parents to observe their child’s counting skills and support them as they provide activities that help children develop math skills.

### OPTIONAL MATERIALS

- Insert Optional Slides 1-7

### OPTIONAL HANDOUTS NEEDED

- Learning Activity for Education Staff: Ongoing Assessment

### ADAPTATION FOR HOME VISITORS

- Learning Activity for Home Visitors: Ongoing Assessment

## Counting: A Brief Example



- A little girl holds four crayons in her right hand. With her left hand, she randomly touches crayons, touching some twice, as she counts “one, two, three, four, five, six.”
- Think-pair-share:
  - What competencies do you see?
  - What might this child’s *next* level of thinking include?

### SLIDE 20:

Read the following:

- The child knows how to recite the number words in order but is not yet keeping one-to-one correspondence as she counts. This is the next level.
  - What competencies do you see?
  - What might you do to promote learning at the next level?

**NOTE:** The optional slide contains a video link that demonstrates this example, if you prefer to use it.

### OPTIONAL MATERIALS

- Insert Optional Slide 8 (if internet is available)



## Developmental Progression: Where Are We Now?



- Where are we now?
  - This child is a “Reciter.”
  - She knows verbal counting, at least up to “six.”
- Where do we go next?
  - She needs to develop the ability to keep one-to-one correspondence.
- Now that we know her present and next (immediate goal) levels, we turn to teaching practices.

### SLIDE 21:

Read the following:

- If you used Optional Slide 8, you can choose to have participants describe what they saw in the video and then proceed with the slide as a summary or just [Click] and read the slide’s 3 bullet groups in sequence, clicking for the 2nd and 3rd group.

**NOTE:** Tell participants that the ELOF p. 57 has its levels of counting. The [LT]2 web tool has all the levels, plus teaching practices.

## LT's Teaching Practices: How Do We Get There?



- Several research-based teaching practices help children learn and use one-to-one correspondence, such as the following:
  - Ask the child to count slowly and carefully, counting each item once
  - If necessary, touch the child's hand gently and count with them
- Home visitors can help parents understand and notice the various developmental trajectories and encourage and support them as they use the teaching practices.

### SLIDE 22:

- Read the bullets. [Click] after the first bullet and read the suggestions.

### OPTIONAL MATERIALS

- Insert Optional Slides 9-16

## Improving Feedback



... 15-Minute ...  
In-Service Suites

- What is the key error?
- What do I think is the reason for this child's error?
- How can I help the child to avoid this error in the future?

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### SLIDE 23:

Read the following:

- When children make errors, ask yourself (or help families ask themselves) the following questions (Shepard, 2005).

Then read the 3 bullets.

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### REFERENCE:

Shepard, L. A. 2005. "Assessment." In L. Darling-Hammond & J. Bransford (Eds.), *Preparing Teachers for a Changing World* (pp. 275–326). San Francisco: Jossey-Bass.

## Feedback for Specific Errors



- Example: Correspondence errors in counting
- Emphasize accuracy—encourage counting slowly, carefully to “count each object exactly once.”
- Explain keeping-track strategies for scattered collections.
  - If moving objects is possible and desirable in the activity, suggest different pile.
  - Explain making a verbal plan, such as “Go from top to bottom. Start from the top and count every one”—then do so.
- For children with visual impairments, guide their hands and count together.

### SLIDE 24:

Read the following:

- Consider children who don't know they have to keep one-to-one correspondence between saying counting words and pointing at objects, or have difficulty doing so.
- One teaching strategy to try first is simply to emphasize taking your time, counting slowly and carefully, counting each object once and only once.
- What about more complicated situations, such as objects in a scattered arrangement? If the objects can be moved, moving one at a time as you could is a good method. If they can't be moved, such as pictures on the page, help children talk about a plan, such as “Go from top to bottom. Start from the top and count each one' and then guide them in carrying out the plan.”

## Should We Always Correct Errors?



- *Not* always.
  - What does the error tell us? What purpose would the correction serve?
- What type of error is it?
- *Example:* Nita, Jen, and a counting mistake.
- Focus on mathematical structure and children’s strategies—not on correct answers.

### SLIDE 25:

- Read the title. Ask participants to think-pair-share for 2 minutes. Then have them report out to the whole group. Connect what they said to the following if possible (or say it will complement what they said).

Read the following:

- [Click] It is not necessary to always correct errors. Math seems unforgiving—one must have the correct answer. But we are in mathematics *education*. What does the error tell us? What purpose would the correction serve?
- [Click] Some errors, of course, are just slips, revealing nothing but a momentary lapse of attention. Should we correct them? That depends. If they hide a mathematical pattern from the child, correcting them removes a barrier. Or if such small slips are considerably more frequent for a particular child than for others the same age, then the child might need help directing attention, controlling impulses (perhaps just slowing down), or taking a second look. But in many cases, small slips are worth ignoring. Focusing on errors can be distracting. It draws attention away from what the child is really working on. It can be more useful to affirm and build on the correct part of a child’s work (Goldenberg, Miller, Carter, & Reed, 2017).
- [Click] 4-year-old friends Nita and Jen were playing “How Many Now?” Mimicking her teacher from a small-group lesson that day, Jen hid three objects under a cloth, added two, and asked “How many now?” Nita said “Four” Her teacher heard the error but decided to wait and listen. Jen added two more and Nita said “Six!” Two more, “Eight!” The girls quickly swept the objects away and started over with Nita hiding the objects. Their teacher decided that correcting Nita’s initial error—which resulted in every answer she gave being mathematically incorrect—would serve no educational purpose.
- [Click] This teacher is wise. We should focus on mathematical structure and children’s strategies not only on correct answers.

### REFERENCE:

Goldenberg, E. P., S. J. Miller, C. J. Carter, & K. E. Reed. 2017. “Mathematical Structure and Error in Kindergarten.” *Young Children* 72(3): 38-44.


## MATERIALS NEEDED

- Tips for Education Staff: Responding to Counting Errors
- Tips for Families: Responding to Counting Mistakes


## ADAPTATION FOR HOME VISITORS


- Tips for Home Visitors: Helping Families Respond to Counting Mistakes
- Tips for Families: Responding to Counting Mistakes

See...



... 15-Minute ...  
In-Service Suites




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**SLIDE 26:**

Read the following:

- See this interesting article on the LearningTrajectories.org Resources page with other examples and tips. We'll remind you at the end of this session.

REFERENCE:

Goldenberg, E. P., S. J. Miller, C. J. Carter, & K. E. Reed. 2017. "Mathematical Structure and Error in Kindergarten." *Young Children* 72(3): 38-44.

## Differentiation with Children Who Are Dual Language Learners



1. Gather information on the children's language history.
2. Embed differentiation assessments in playful, low-stress settings that are familiar to children.
3. Choose culturally meaningful and familiar materials.
4. Connect math terms to children's home or Tribal language.
5. Use multiple representations.
6. Discern between emerging competence versus struggles with expressive vocabulary.
7. Use tiered levels of questions.

### SLIDE 27:

Read or paraphrase the following:

- First, remember that a child who is a dual language learner (DLL) or Tribal language learner (TLL) is still in the process of learning their first language. They don't yet know enough in their home language, Tribal language, or English to form a foundation for future learning, so they need access to what they have learned in both (Espinosa, 2013) when engaging in mathematical conversation and activities. This is how you can support children who are DLLs or TLLs in counting:
  1. The Planned Language Approach recommends that teachers, family child care providers, and home visitors take the time to gather background information about the child's language history.
    - a. For example: How many languages does the child/family speak? Is the child a simultaneous or sequential English language learner? What is the child's dominant language at home? What other kinds of English language experiences does the child have?
  2. Choose materials that give children clues about the skills they are supposed to be learning, regardless of how much English or how much of their Tribal language they understand (<https://www.naeyc.org/resources/pubs/tyc/oct2017/make-math-meaningful-diverse-learners>).
  3. Connect English or Tribal language to children's first language
    - a. Find out whether the child can count in his/her home language, which may be English for TLLs.
    - b. Use the language of the child—write it down on a single index card to carry with you in your pocket.
  4. Accept multiple representations as responses to tasks—for example, fingers, marks on paper.
  5. Consider tiered levels of questions in order to assess child understanding (Krashen & Terrell, 1983; Tabors, 2008).
    - a. Non-verbal questions (closed): “Show me...”, “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?”
  6. See also the resources on LTLT, pictured on the next slide.



## Dual Language and Tribal Language Learners

- Teach critical words or phrases from the “big ideas” of mathematics.
- Provide ongoing, special, focused experiences, often with visuals and home language support (which benefit all children).
- Be aware of common phrases, idioms, and colloquialisms.
- Learn and use Spanish cognates—words or roots that are similar in English.
- Good curricula should provide these!

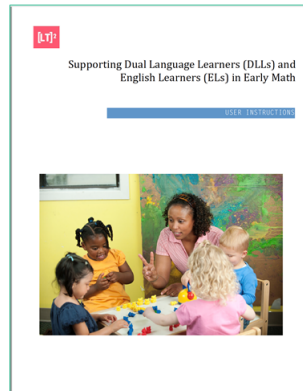
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### SLIDE 28:

Read the following:

- Big ideas are the main concepts we want to teach children. These are the key ideas and skills that are central to mathematics, consistent with children’s thinking, and generative of future learning. They include terms such as *number*, *more than*, *pattern*, and so forth.

# Supporting Dual Language Learners & English Learners in Early Math



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## SLIDE 29:

Read the following:

- Also see this extensive resource on the [LearningTrajectories.org](https://www.learningtrajectories.org) Resources page.



## Differentiated Instruction Benefits All Children



- Create strong visual components
- Provide collaborative activities where there are opportunities for peer learning
- Consider a multi-sensory approach
- Construct formative assessment formats that build on children's strengths

### SLIDE 30:

Read or paraphrase the following:

- Differentiated instruction benefits all children.
- Adults can present content in ways that do not solely rely on verbal explanations. Use and accept multiple representations of a single concept or idea.
- Provide opportunities for children to work with partners or small groups. This presents children with an opportunity to engage with the material outside of a whole group format. Breaking children up in smaller groups also creates opportunities for them to answer your questions, solve a problem, or practice a skill—potentially with a more skilled peer.
- Considering relying on mediums other than print to share and present information and ideas. Help children “see” the math problem in action.
- Accept multiple methods of solving a math problem. Some children want to draw a picture, while others need manipulatives.
- One way to enact all the bullet points listed here is to do a small group activity where peers act out a math story problem and its potential solution.

## Review

... 15-Minute ...  
In-Service Suites



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### SLIDE 31:

Read or paraphrase the following:

- Understand where children are developmentally, as a group and individually. Tailor your teaching practices to meet their needs.
- Use the learning trajectory for counting to answer these three questions:
  - Where are we trying to go? (A. LT Goal)
  - Where are we now? (A. LT's developmental progression)
  - How can we get there? (A. LT's environments, activities, teaching)
  - Observe children, follow their progress, and *modify interactions and activities* to give them challenging but achievable learning opportunities.

### MATERIALS NEEDED

- Helpful Resources
- Tools for Center-Based Supervisors
- Tools for Home-Based Supervisors

## LT<sup>2</sup>: Learning and Teaching with Learning Trajectories



- See the Learning and Teaching with Learning Trajectories website for more trajectories, videos, and instructional math activities!
- [LearningTrajectories.org](http://LearningTrajectories.org)
- ECLKC LT<sup>2</sup> Video Library  
<https://eclkc.ohs.acf.hhs.gov/school-readiness/article/math-learning-trajectories>



### SLIDE 32:

- Read the slide.
- Encourage participants to find more information about trajectories on the ECLKC.
- From there, they can access the [LT]2 site, which includes over 1000 videos, instructional activities, and computer games across multiple math categories. Registration and use are free.
- Remind participants that they can also access video resources without creating an account on the ECLKC.

### OPTIONAL MATERIALS

- Insert Optional Slide 17