



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

DIFFERENTIATING LEARNING OPPORTUNITIES IN EARLY MATH



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Early Childhood Development, Teaching and Learning

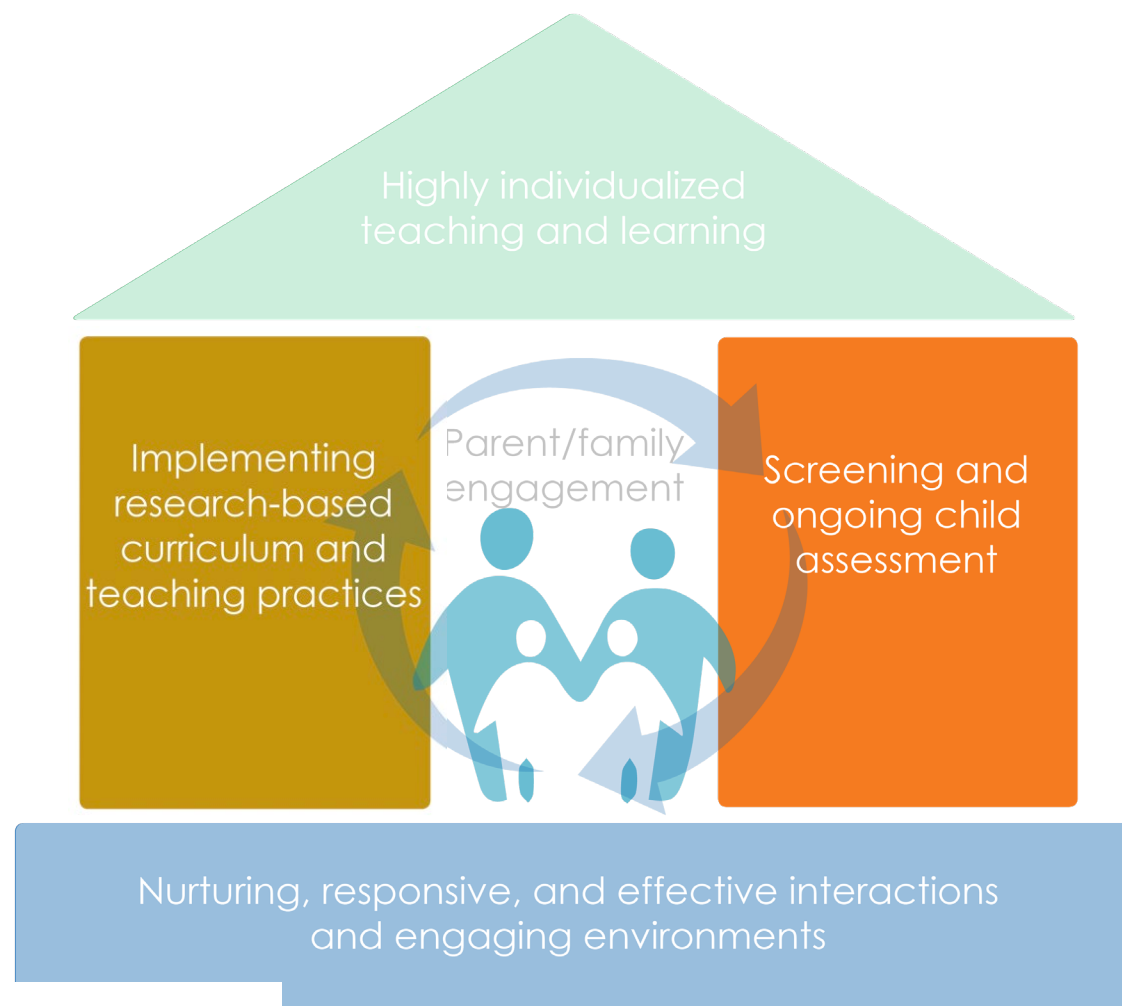


Framework for Effective Practice



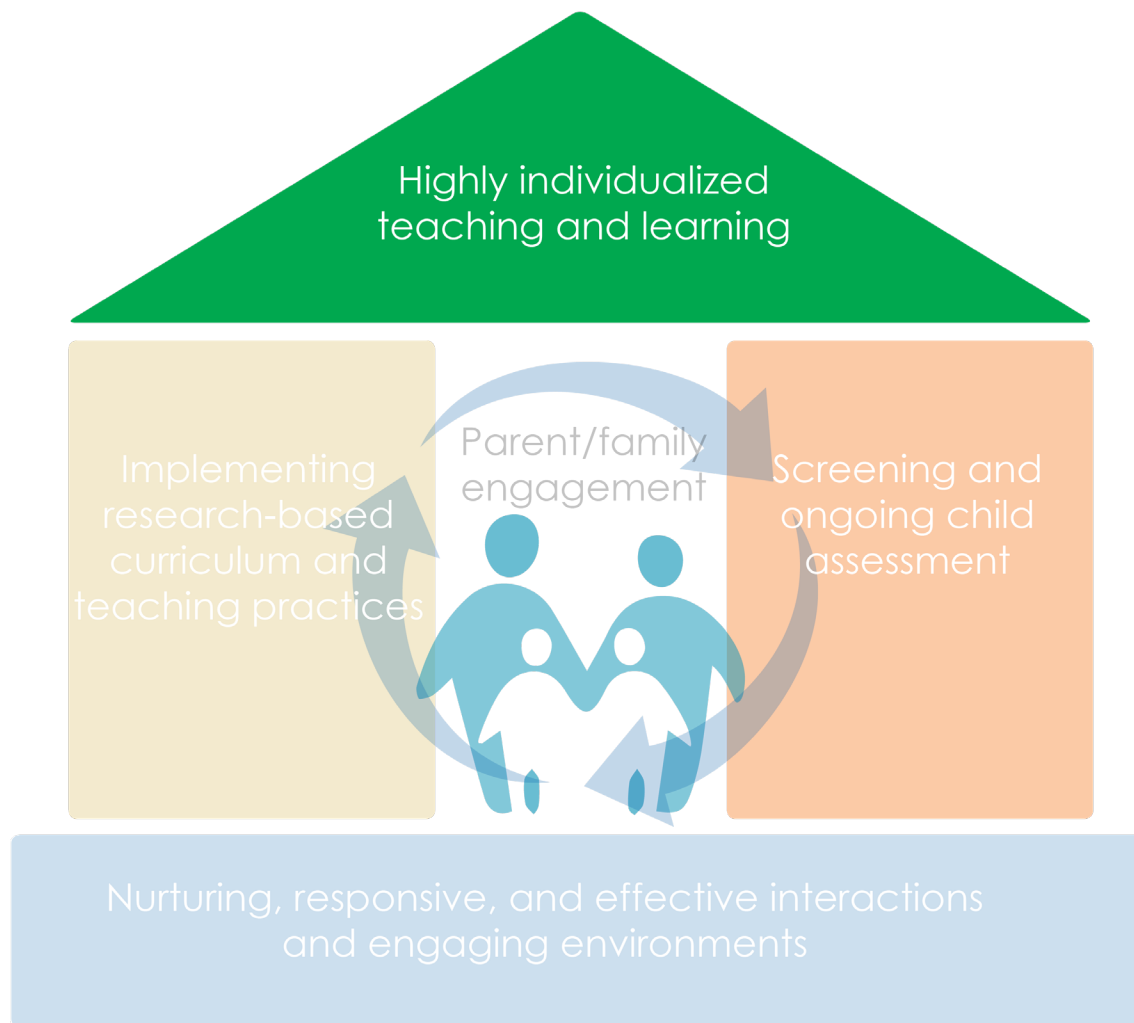


Framework for Effective Practice



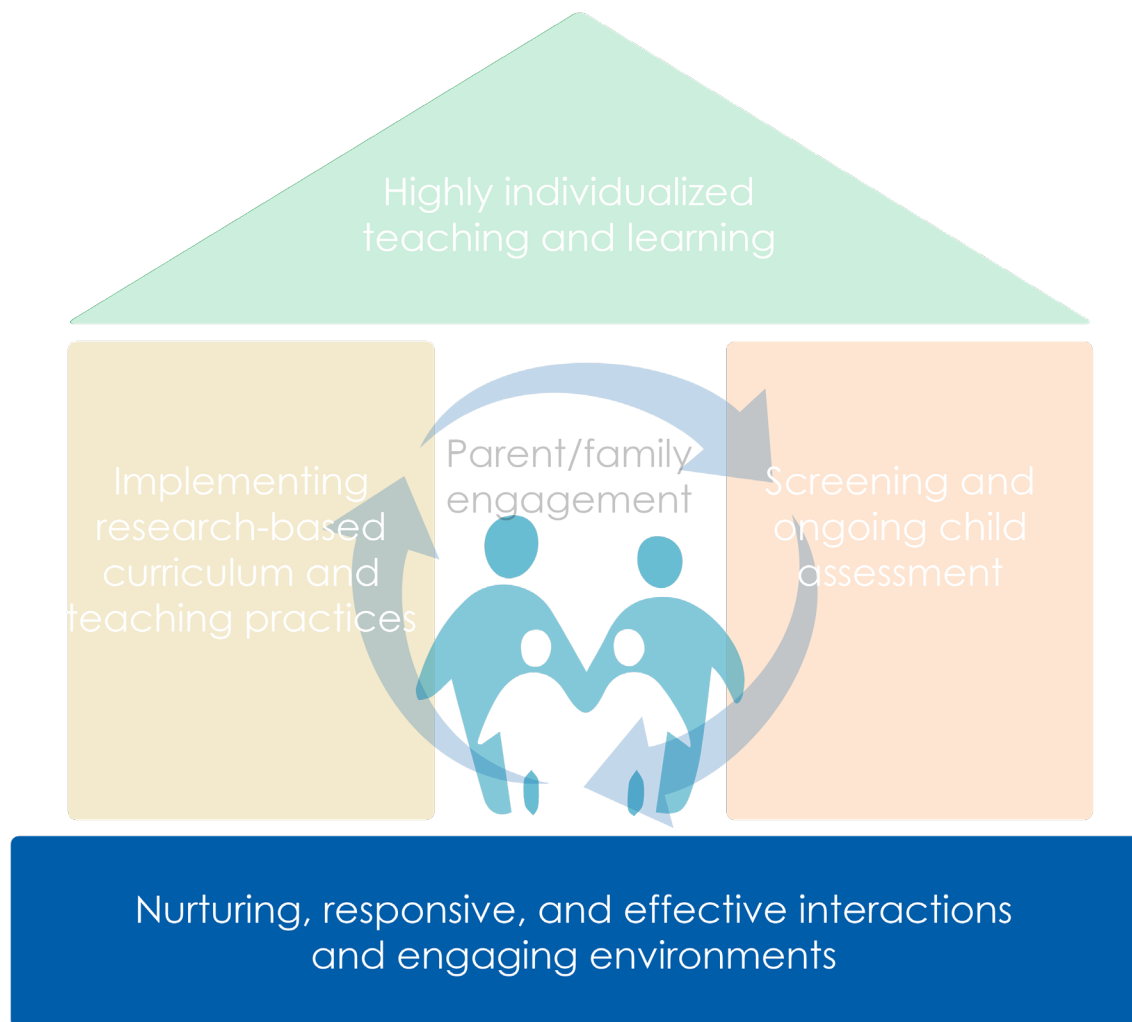


Framework for Effective Practice





Framework for Effective Practice





Early Math Found in the ELOF

	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	





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.



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.



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.



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.

How Well Are Education Staff Supported?



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- 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?



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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.

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Differentiation Starts Early

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



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.



Learning Trajectories

- 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....





Learning Trajectory's 3 Parts

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



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



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*.

Developmental Progression and Assessment: Where Are We Now?



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- 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.





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?



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.



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.



Improving Feedback

- 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?



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.



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.



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See...



Young Children Home > Mathematical Structure and Error in Kindergarten

Mathematical Structure and Error in Kindergarten

- Current Issue
- E-zine (Members Only)
- Past Issues
- Columns
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- Search for Articles and Authors



By E. Paul Goldenberg, Sharon J. Miller, Cynthia J. Carter, and Kristen E. Reed

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There's a growing literature on using children's "misconceptions" to diagnose their thinking and to target interventions. [Read more](#)



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Differentiation with Children Who Are Dual Language Learners



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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.





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!

Supporting Dual Language Learners & English Learners in Early Math



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[LT]²

Supporting Dual Language Learners (DLLs) and
English Learners (ELs) in Early Math

USER INSTRUCTIONS



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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



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Review



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LT²: Learning and Teaching with Learning Trajectories



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- See the Learning and Teaching with Learning Trajectories website for more trajectories, videos, and instructional math activities!
- [LearningTrajectories.org](https://learningtrajectories.org)
- ECLKC LT² Video Library
<https://eclkc.ohs.acf.hhs.gov/school-readiness/article/math-learning-trajectories>



LT²

