

# **Chapter 8: Beginning Numeracy Skills**

**What mathematical skills and understandings are  
foundational for all students?**

by Alicia F. Saunders, Ya-yu Lo & Drew Polly

“Children’s mathematical understanding in real life and in upper grades is linked to their understanding of numbers, including what they are and how they relate to one another.”

(Leinwand, 2012) p. 150.



# Number Sense

... an individual's ability to understand numbers and operations and use these concepts and strategies to make mathematical judgements and for more complex problem solving.

(NCTM, 2000) p. 150



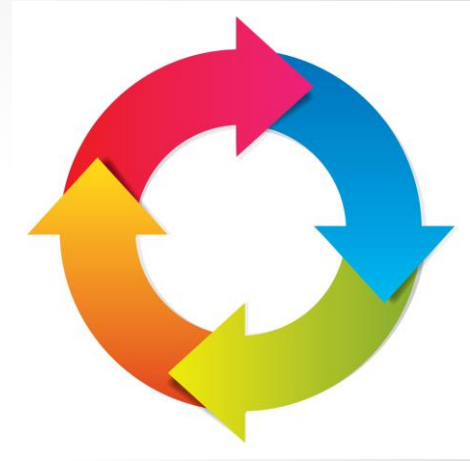
# Instructional Methods

**Systematic instruction:** student has controlled opportunities to practice skills to reach mastery

**Explicit instruction:** skills are modeled for the student and support is provided during practice

## Systematic instruction:

- time delay
- system of least prompts
- simultaneous prompting
- feedback
- in-vivo instruction (real-world situations)



# Systematic Instruction

*Time Delay:* delaying the amount of time a student has for making a correct response before being prompted.

Variations include:

- Constant
- Progressive



# Systematic Instruction

*System of Least Prompts:* use increasing levels of prompting following an incorrect response or no response until the student is able to correctly answer.

*Typical prompt hierarchy:*

*Verbal*  *Model*  *Physical*

# Systematic Instruction

*Simultaneous Prompting*: a controlling prompt is provided along with the task direction to produce errorless learning.

*Example*: “Which one is 2?” (no time delay)  
“Look, this one is 2!”  
“Now show me which one is 2.”



# Explicit instruction:

- teacher models answers with multiple examples (“I do”)
- student practices new skill/verbalizes (“We do”)
- student does task and teacher provides feedback, error correction and frequent review (“You do”)

# Early Numeracy Skill #1

**Rote counting:** identify numbers in a sequence.

*Introduce 1-5; 1-10; 1-15; 1-20*

*Count forward and backward from any given number. Start at 5 and count to 10.*

# Early Numeracy Skill #2

Number identification: recognize numbers have numerical representations and verbal names.

*Receptive: Show me 5.*

*Expressive: What number is this?*



# Early Numeracy

## Skill #3

**One-to-one correspondence:** coordinated counting with touching or moving of objects to determine the quantity of a particular set.

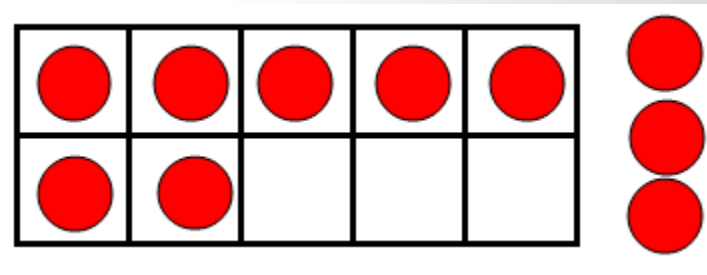
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*Cardinality (last count word is number in set)*

# Early Numeracy

## Skill #4

**Creating sets:** organize objects into a specific number.



*Create a set of four.*

*Graphic organizers (five- or ten- frames) build spatial organization.*

# Early Numeracy

## Skill #5

**Composing and decomposing numbers:**  
based on the part-part-whole model.

- given the whole and one part,  
find the missing part ( $\_ + 2 = 5$ )
- given the whole, identify both parts  
( $\_ + \_ = 5$ )

# Early Numeracy

## Skill #6

**Comparing quantities:** which set of objects has more/ which set of objects has less?

*Teach opposite concepts separately to avoid confusion.*

# Early Numeracy Skill #7

**Patterns:** build algebraic thinking and reasoning by identifying and extending patterns.

*Begin with physical object patterns, then number patterns.*





# Create a Meaningful Context

Combine numeracy skills into one lesson and create multiple opportunities to practice each skill.

Embed skills in games, activities and stories throughout the day.



Use **technology**  
to increase attention,  
motivation and  
opportunities for practice.





Teach early numeracy skills concurrently with grade level math.

Students with significant disabilities can develop early numeracy skills with **systematic** and **explicit** instruction that is **meaningful** and **engaging!**

