



Playful Math Instruction

Deborah Stipek

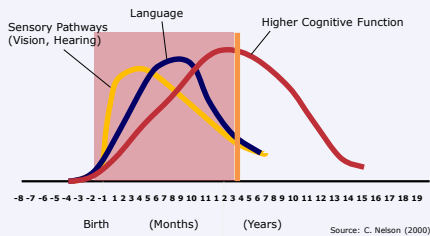
November 1, 2017

Early Childhood Investigations

Early Math Matters

1. Brain development before children begin school is rapid and provides the foundation for future learning.
2. The achievement gap in math exists before children enter kindergarten.
3. The math skills children enter kindergarten with are highly predictive of later achievement.
4. Kindergarten standards have risen.
5. Young children can and love to do math activities.

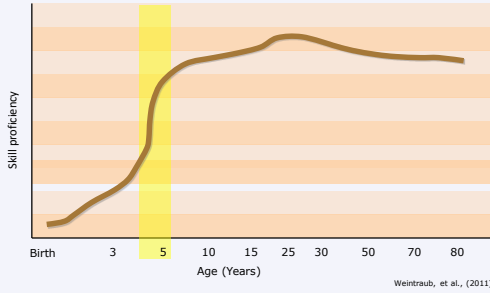
Growth in Brain Development



<https://dreme.stanford.edu>

Development and Research in Early Math Education DREME

Brain Development for Executive Functions



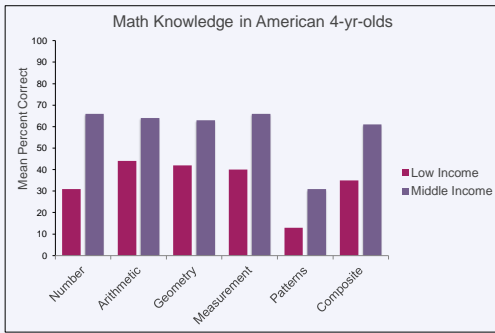
Weintraub, et al., (2011)

<https://dreme.stanford.edu>

Development and Research in Early Math Education

DREME

Math Knowledge in American 4-yr-olds

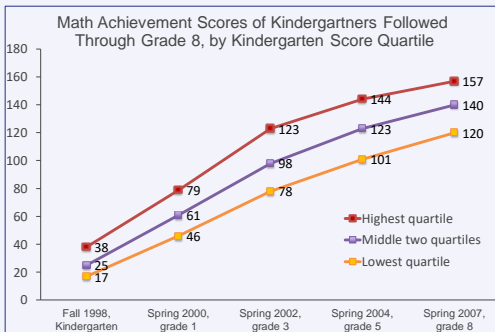


<https://dreme.stanford.edu>

Development and Research in Early Math Education

DREME

Math Achievement Scores of Kindergartners Followed Through Grade 8, by Kindergarten Score Quartile



<https://dreme.stanford.edu>

Development and Research in Early Math Education

DREME

Effect of Persistent vs. No Problems at Ages 6, 8, and 10 on High School Completion and College Attendance

Persistent Problems in...	High School Completion	College Attendance
Reading	-.05	-.06
Math	-.13*	-.29**
Antisocial Behavior	-.10***	-.24*

<https://dreme.stanford.edu>

Development and Research in Early Math Education

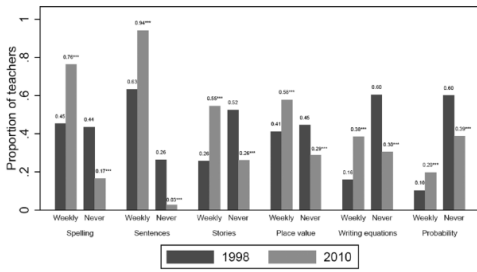
DREME

Common Core Kindergarten Standards

- Count to 100 by ones and by tens
- For any number from 1 to 9, find the number that makes 10 when added to the given number
- Compose and decompose numbers from 11 to 19 into ten ones and ones
- Describe measurable attributes of objects, such as length or weight.
- Compose simple shapes to form larger shapes.
- Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference.

POLL

Kindergarten is the New First Grade

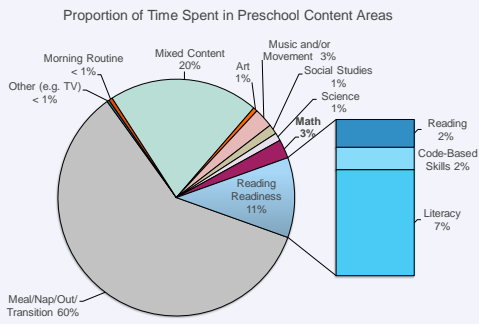


<https://dre.me.stanford.edu>

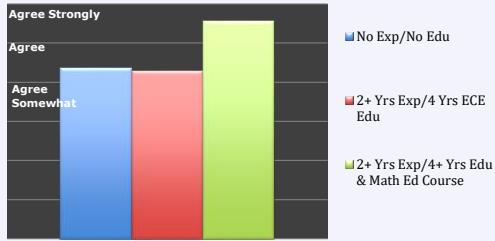
Development and Research in Early Math Education

DREME

But not much Math Happening in Preschools



POLL



Math activities are age-appropriate for preschoolers.

Platas, 2011

<https://dreme.stanford.edu>

Development and Research in Early Math Education

DREME

POLL

Complaints about Standards


1. Focus attention on basic academic skills and away from other important dimensions of development
2. Encourage developmentally *inappropriate* teaching
3. Undermine the joy of learning

No Standards?

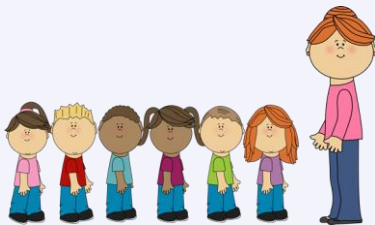
- If we don't know our destination, how do we know how to get there?
 - How do we determine whether children are making progress?






Standards can be useful if they...

- guide but don't dictate instruction
 - Standards provide the long-term goals; the short-term goals (in route) are based on what children know and understand
- inform assessments used to track children's progress
- inform choice of curriculum used to provide scope and sequence for learning
 - *Rebel against strict pacing!!* 

But what about "teaching"?



“Teaching” has a bad rap

- associated with teacher-directed, didactic instruction—flash cards and worksheets 
- believed to interfere with children’s natural curiosity and joy of learning 
- and competes with:
 - time for play 
 - opportunities to develop social-emotional skills

Theories of Teaching

◆ Child-Centered (constructivist)

- Children discover through direct experience
- Children choose
- Process stressed
- **Play**



◆ Teacher-Directed (learning theory)

- Children learn what teachers teach
- Teachers choose
- Performance stressed
- **Work**



POLL

What is not included

- Rote counting
- Calendar
- Worksheets
- Macaroni math

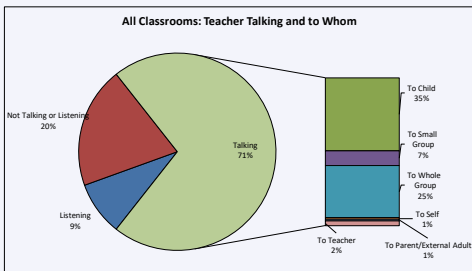


Effective, Playful Math Instruction

- Teacher plans activities with clear learning goals
- Identifies, designs, and prepares materials
- Provides direction
- Engages children in conversation
- Assesses learning
- Designs individual & group interventions

Teacher Verbal Behavior

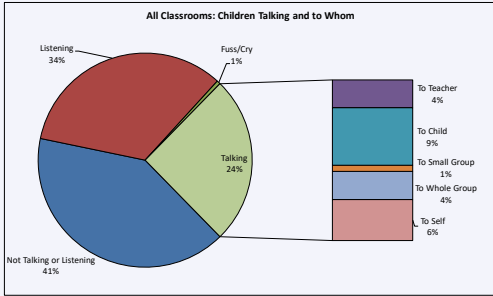
(talk by teacher during the 3.25 hour learning opportunity)



Farran, ECMC

Child Verbal Behavior

(Talk by children during the 3.25 hour learning opportunity)

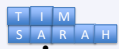


Farran, ECMC

- <http://pbskids.org/lab/activity/shoesorting/>

Other Activities

Letters in name



Shape hunt



Map of classroom



Store

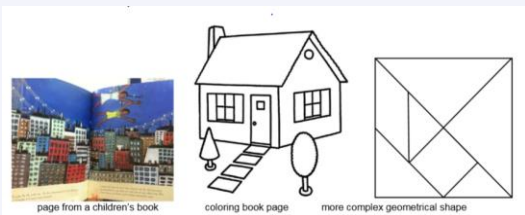
Making Counting Fun



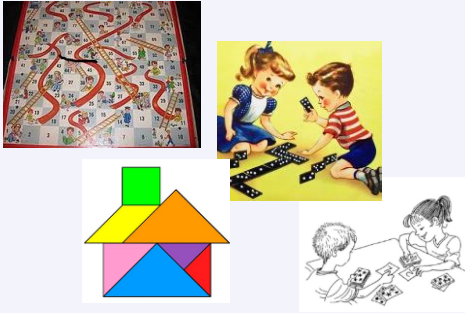
Using Picture Books



Describe, Draw, Describe



Games



Teachable Moments

- Take advantage
- But not sufficient
 - depends too much on chance

