Math? In early childhood?!

Developmentally appropriate practice tells us this is not a good idea.

The CCSS-M and research on the kindergarten achievement gap tell us this is imperative.

Getting Ready to Succeed in Math: What Educators Need to Know

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What do teachers need to know?

1. Early childhood math matters ... a lot.
2. Early childhood math is an interconnected web of skills.
3. The math achievement gap is about symbols and symbol grounding.
4. There are simple strategies teachers can use.
Early Childhood Math Ability Matters

- Kids who are low on math at kindergarten entry, usually remain low on math throughout the school years.
- Math ability in kindergarten predicts later math achievement better than either IQ or SES.
- Math ability in kindergarten is the strongest predictor of overall school achievement (including reading) --- stronger than reading, attention, or social adjustment.

Development is like compounding interest.

[Graph showing compounding growth over time with labels 'low start' and 'high start'.]
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Early childhood math is an interconnecting web of skills.

How are these two situations different?

"one-two-three-four-five-six-seven-eight-nine-ten"

"one-two-three-four-five-six-seven-eight-nine-ten"
Early childhood math is an interconnecting web of skills.

How about these?

"one-two-three-four-five-six-seven-eight-nine-ten"

Early childhood math is an interconnecting web of skills.

"Three"

3

"one-two-three"
Early childhood math is an interconnecting web of skills.
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Early childhood math is an interconnecting web of skills.

Mary picks 3 apples and John picks 2 apples. How many apples do they have all together?

\[ 3 + 2 = 5 \]

\[ 3 + 2 > 3 - 2 \]

Early childhood math is an interconnecting web of skills.
COMMON CORE STATE STANDARDS
Kindergarten

Know number names and count sequence to 100

Count to tell how many

Compare numbers

Understand adding as putting together, subtracting as taking apart

Addition/subtraction facts up to 5

Decompose numbers 1-10

Understand place value in teens (11-19)

Classify objects and count them

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These kindergarten skills predict later achievement.
- Count up to 10 dots
- Comparing written digits (e.g., 4 vs. 9)
- How many? Estimate set size up to 16.

These kindergarten skills do not.
- Compare two large groups of dots (32 > 16)
- Match equivalent object sets (3 dogs = 3 cars)

(Baielet, Vaessen, Blomeert & Ansari, 2014; Lyons et al., 2014)

The gap is about symbol grounding.

What does this mean?
The gap is about symbol grounding.

四 shi/yon
五 go
六 roku
七 nana
八 hachi

Do the spoken words help?

一二三四四五
六七八九十

How about now?
The gap is about symbol grounding.

- Math achievement is predicted by early symbolic ability, not nonverbal concepts.
- Low SES kids do well on nonverbal tasks, but they lag on verbal tasks.
- Low SES parents provide less input on counting and numeracy than middle SES parents.

What do teachers need to know?

1. Early childhood math matters ... a lot.
2. Early childhood math is an interconnected web of skills.
3. Early childhood math is important and necessary for later math success.
4. There are simple strategies teachers can use.
Teaching can close the gap!

Some facts about adult input . . .

- The more that kids are exposed to number talk, the better they perform on number tasks.
- But in 8 hours of observation, some parents talked about number/math only 3 times (range = 3 – 175)
- And in a typical one-hour lesson, some teachers talked about number/math only 1 time (range = 1 – 104)
Teaching can close the gap!
Scaffolding all of the mappings helps.

"Look! Four blocks. One-two-three-four!"
Teaching can close the gap!

Playing simple board games improves numeracy...

Board games, dice, spinners (Bob Siegler)

Teaching can close the gap!

Practice calculating with objects, fingers, and imagined objects helps.