

The Complexity of Early Mathematics Education

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erikson

U.S. Mathematics Education:

**A Concern for
Almost 25 Years**



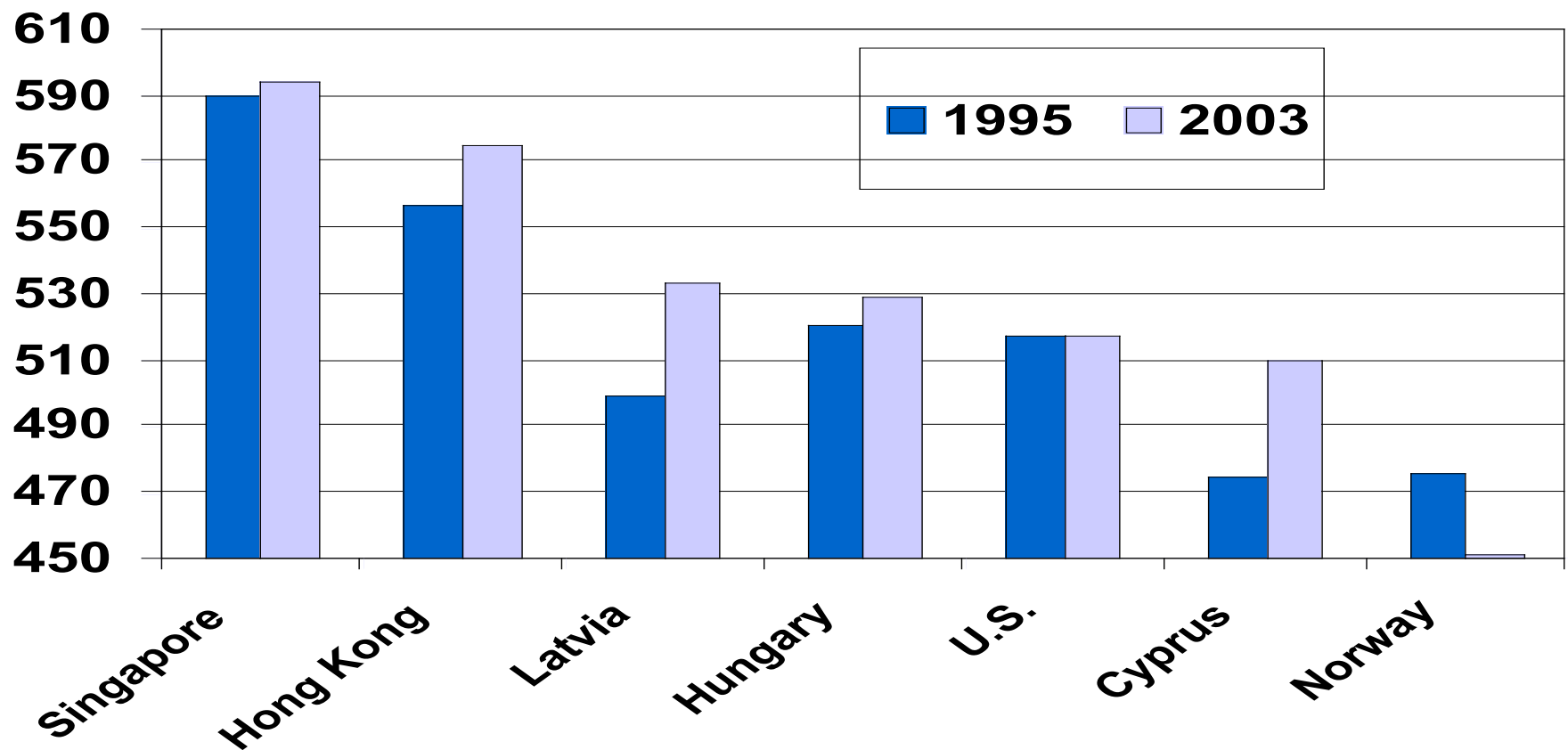
United States

**Other
industrialized
nations**



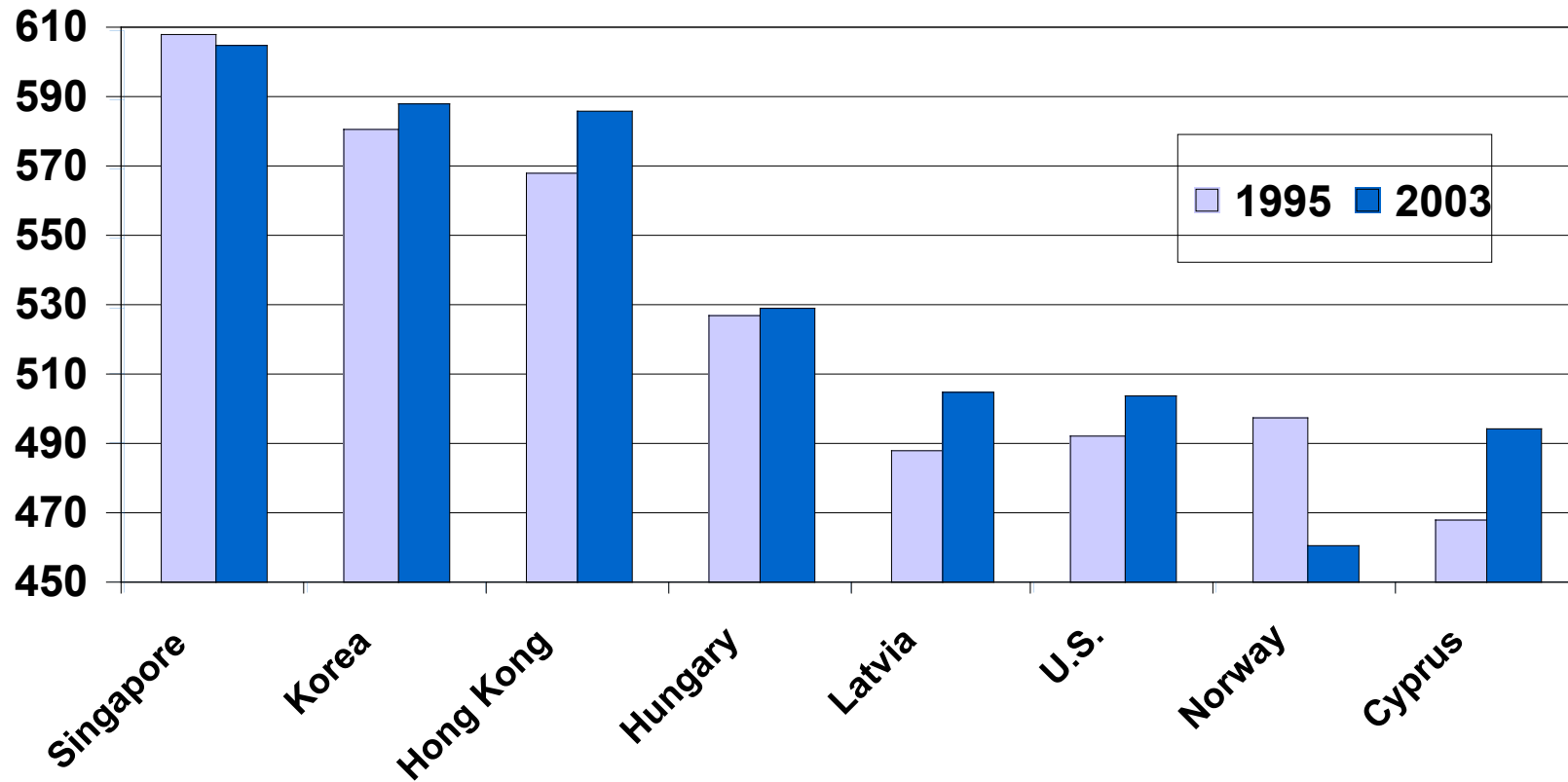
In 1983, the Commission on Excellence in Education first reported U.S. students “lagging behind” other industrialized nations

No Improvement Among U.S. 4th Graders



(NCES, 2003 TIMSS Highlights)

Inadequate Improvement Among U.S. 8th Graders



(NCES, 2003 TIMSS Highlights)

School Readiness and Later Achievement

Kindergarten

entry

Early **reading** skills

3rd to 8th grades

Later **reading** achievement

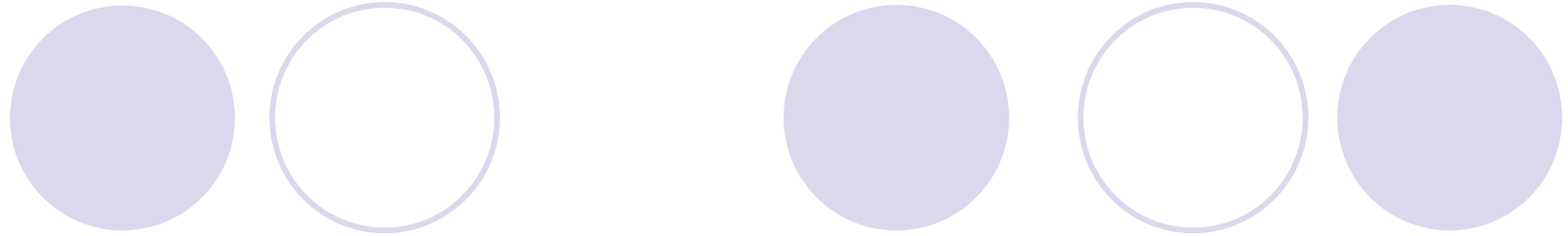
Early **math** skills
achievement

Later **math**

Early **math** skills

Later **reading** achievement

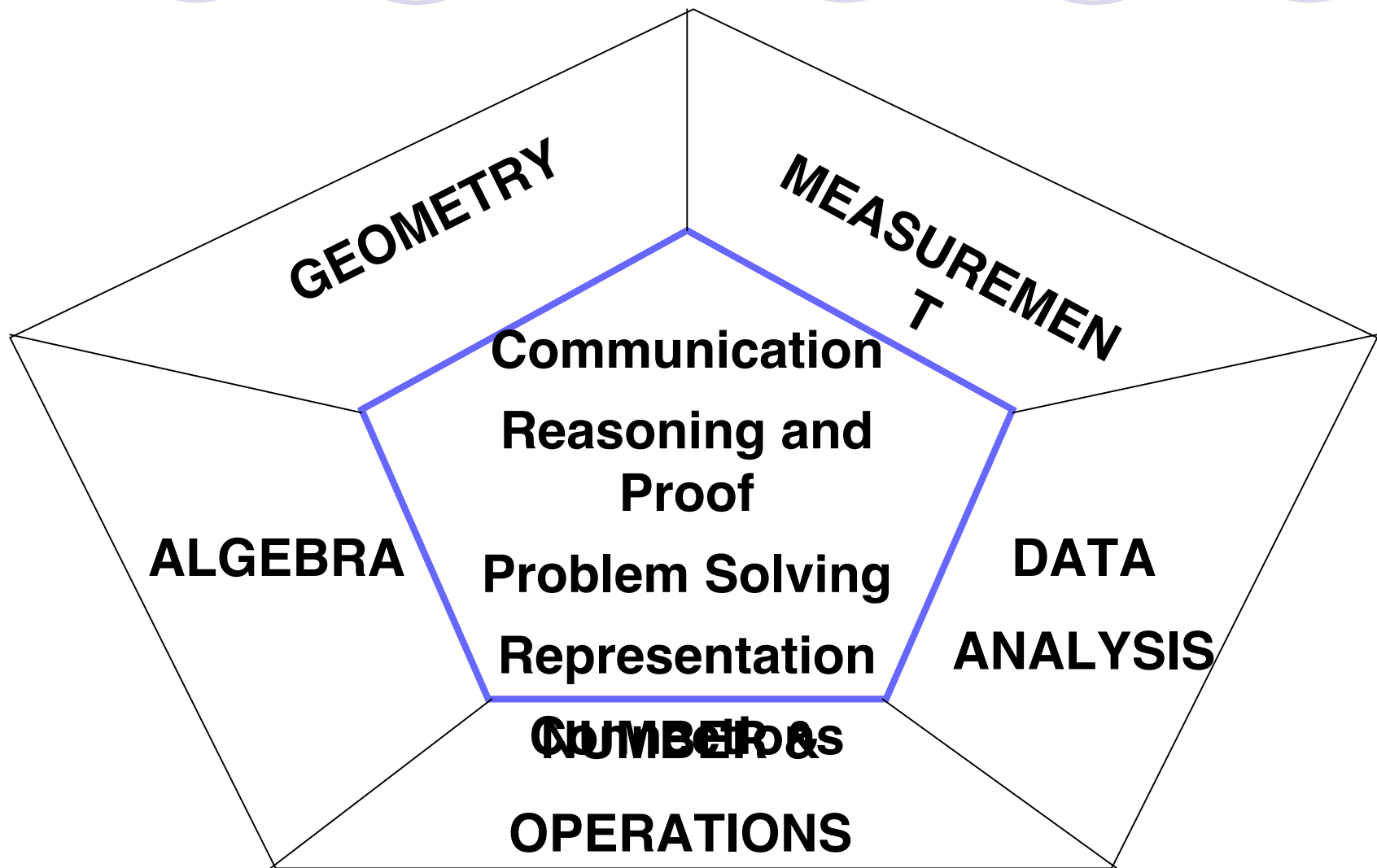
Duncan, et al.
2007



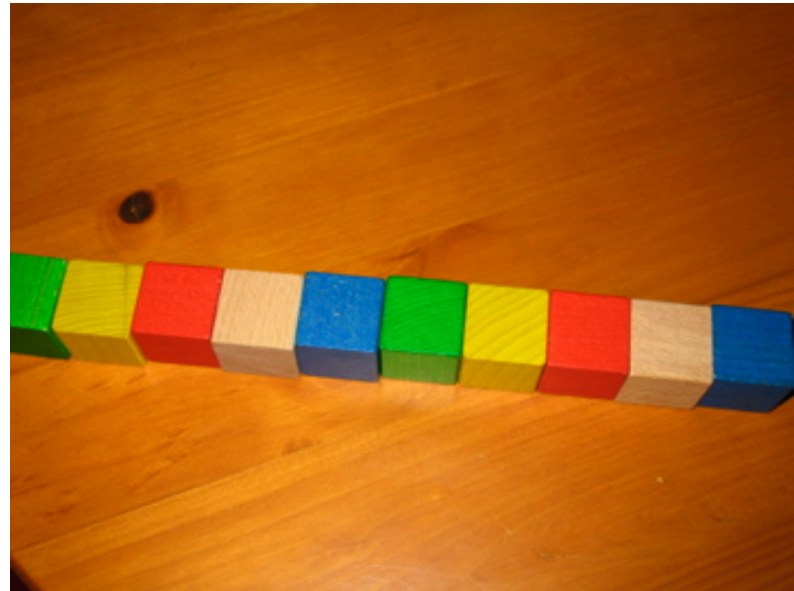
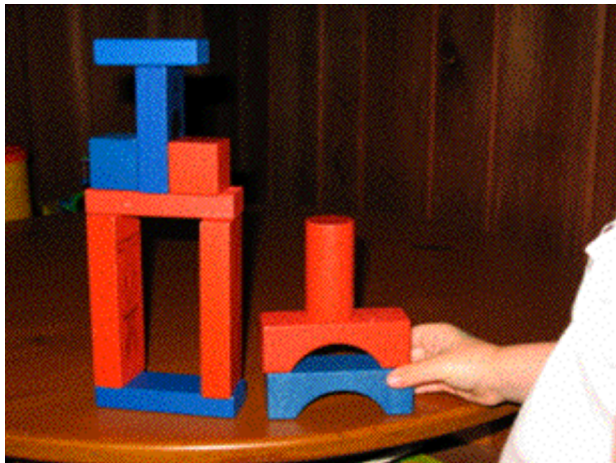
Myth 1:

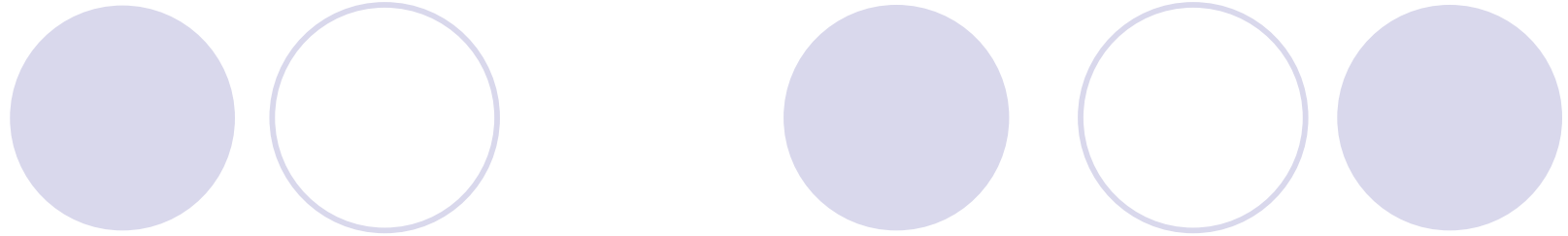
**Early mathematics education
is primarily learning
numbers and shapes.**

National Council of Teachers of Mathematics (NCTM) Content & Process Standards



Sample of a Child's Algebraic Thinking

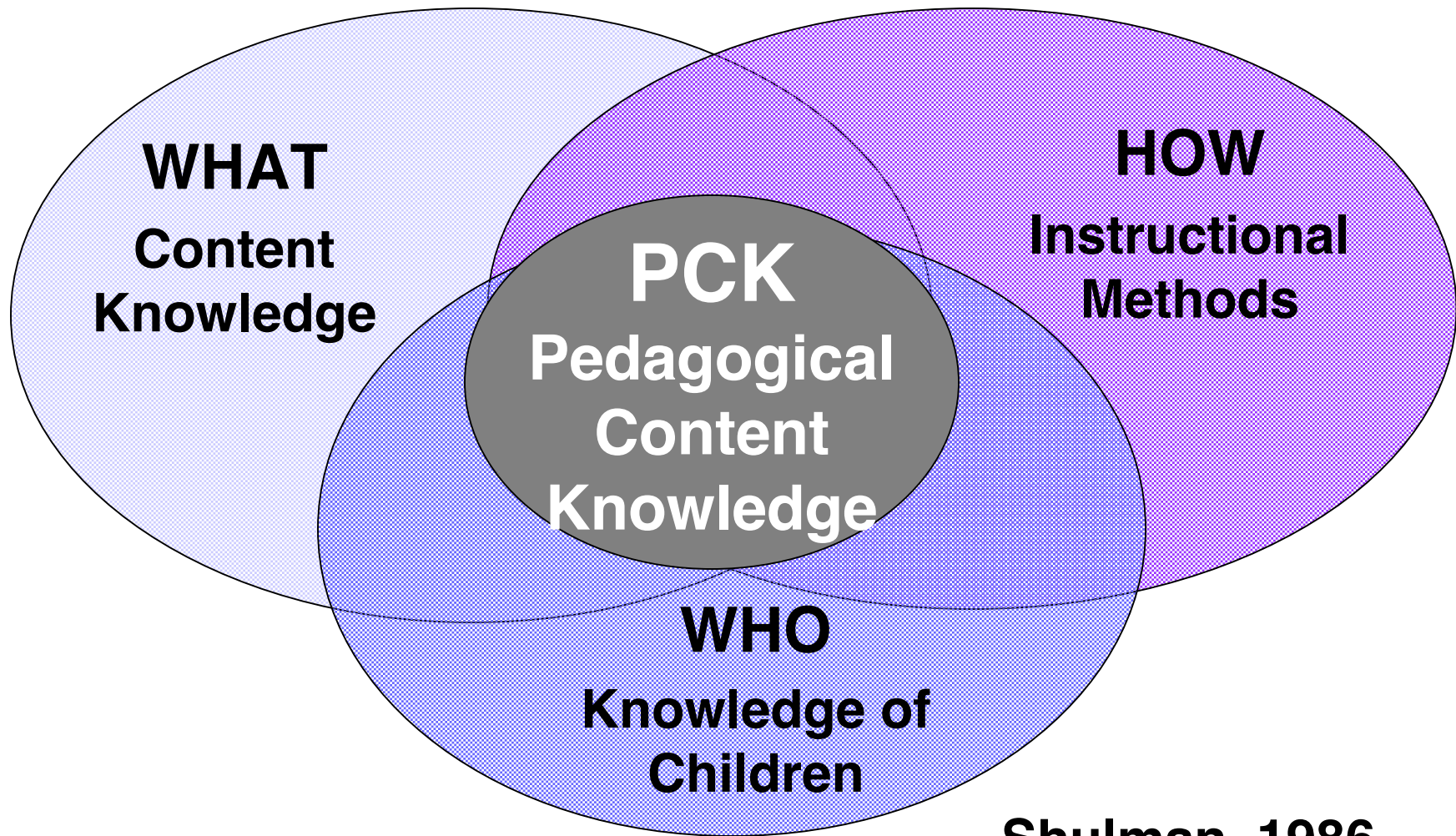




Myth 2:

**Teaching early mathematics
is easy since it's about the
most basic math.**

Early Mathematics Teaching

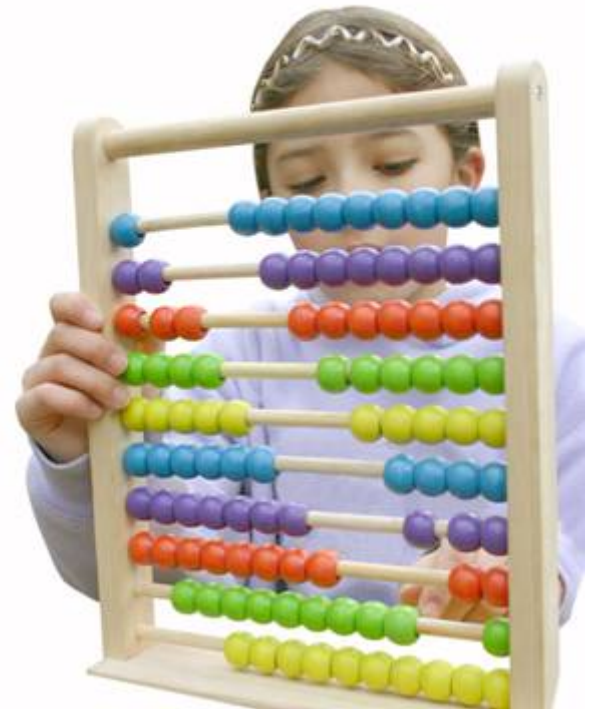


**Shulman, 1986,
1987**

Counting is Complex



+



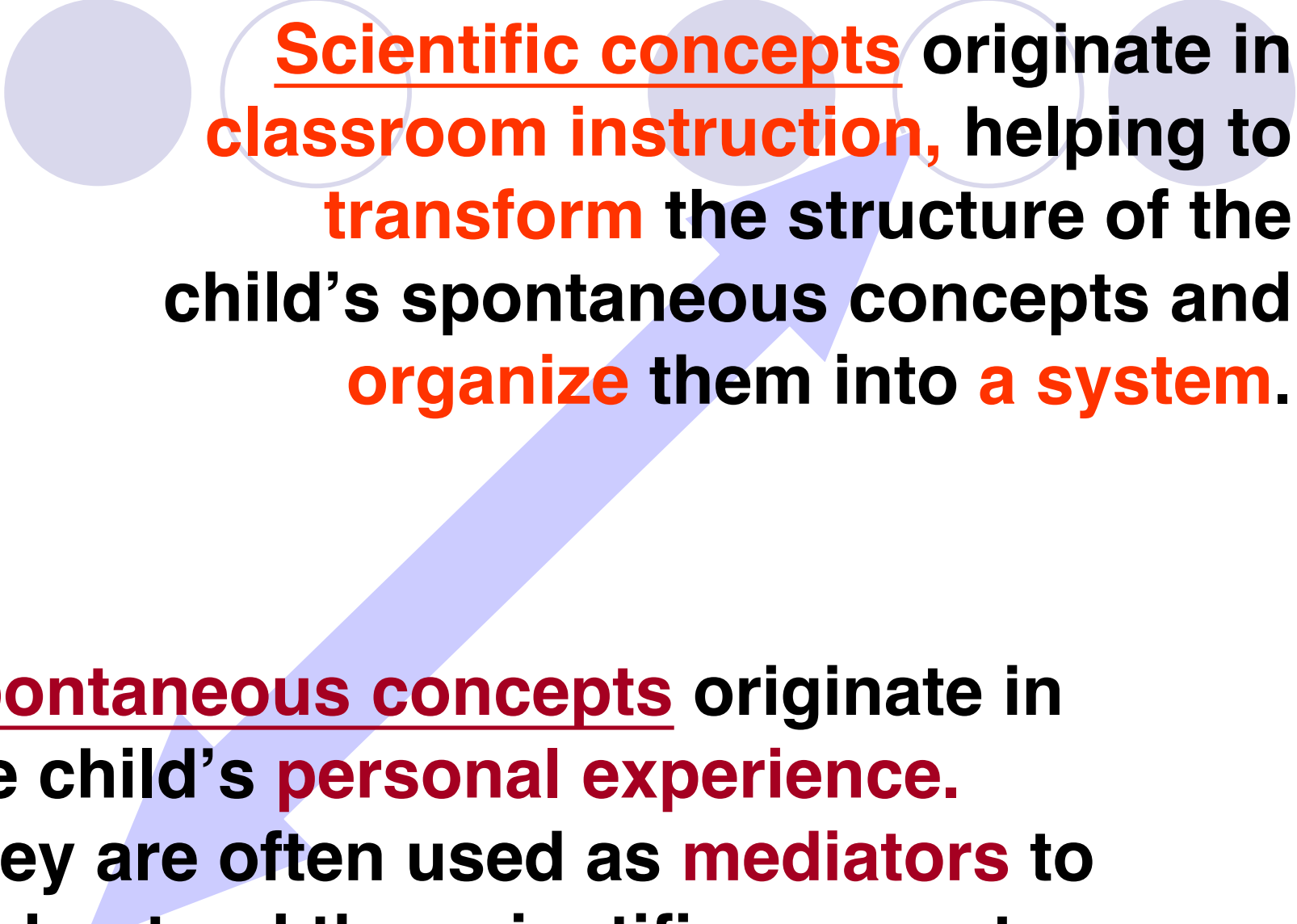
Number is Complex





Myth 3:

Young children pick up mathematics concepts naturally through play and in their daily lives. Direct instruction is unnecessary and developmentally inappropriate.



Scientific concepts originate in classroom instruction, helping to transform the structure of the child's spontaneous concepts and organize them into a system.

Spontaneous concepts originate in the child's personal experience. They are often used as mediators to understand the scientific concepts.

Vygotsky, 1978

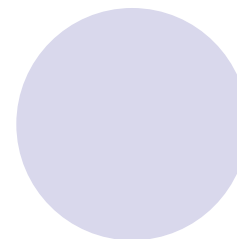
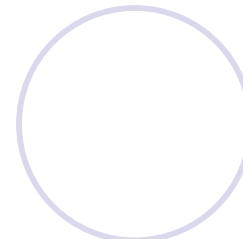
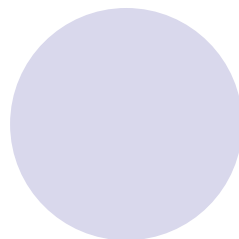
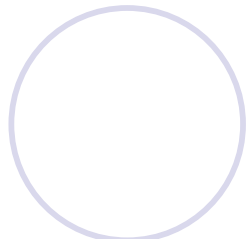
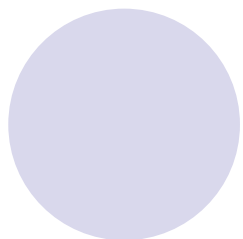


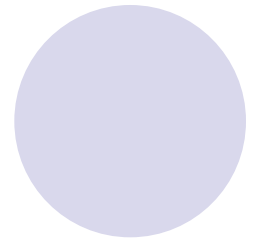
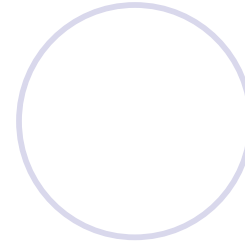
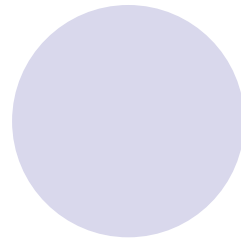
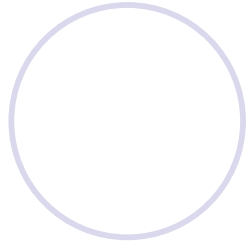
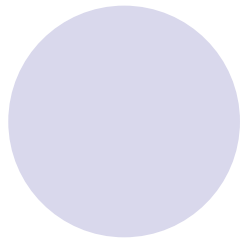
Good early mathematics should...

Enhance children's *natural interest* in mathematics; and

Build on children's varying experiences, including their family, linguistic, and cultural backgrounds.

--NAEYC/NCTM Joint Position Statement, 2002





Myth 4:

Early mathematics learning happens through hands-on activities with manipulatives.

There is a significant relationship between the amount of math-related talk by preschool teachers and the growth of mathematics knowledge in their children over the school year.

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**Children do not
learn by doing.
They learn by
thinking and
talking about
what they are
doing.**

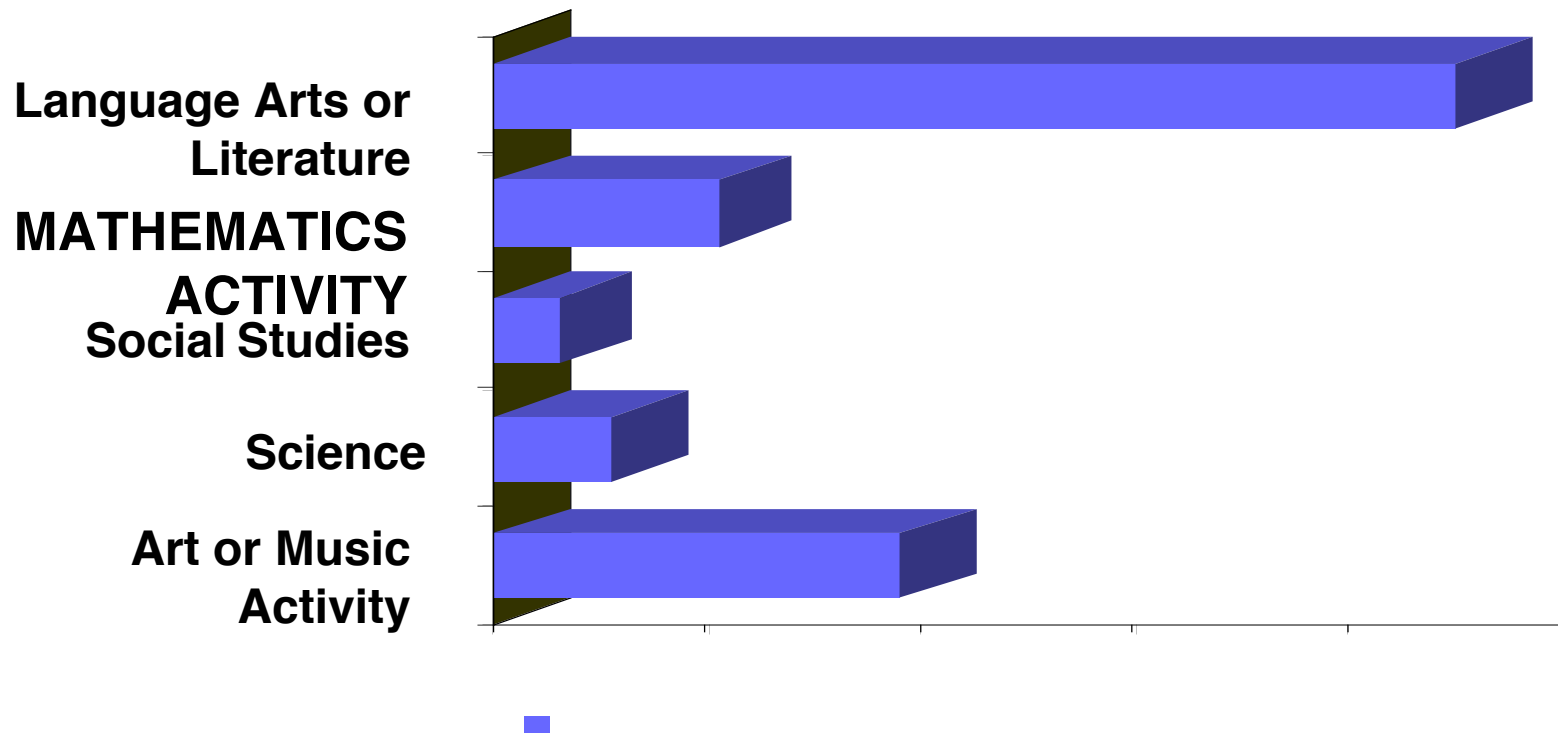
--Angela Andrews



Our Challenge:

Most early childhood teachers are not adequately prepared to teach early mathematics.

Chicago Early Childhood Mathematics



Mathematics activities take place in only 21 percent of CPS early childhood classrooms on a given day

(Chicago Program Evaluation Project, 2007)



Teacher Preparedness

Percent of early childhood teacher education programs in New Jersey's 4-year colleges that provide ...

| | |
|--|-----|
| A course focused on early literacy | 80% |
| A course focused on early mathematics | 16% |
| Mathematics <u>only</u> as part of integrated ece curriculum | 7% |
| No early mathematics training at all | 10% |

Lobman, Ryan, & McLaughlin,
2005

The Early Mathematics Education (EME) Project

- **Supported by McCormick Foundation and CME Trust**
- **Served 80 CPS preschool and kindergarten teachers and the 2,500 children they teach in 2007-2008**
- **Are serving an additional 86 teachers this year**

Two Elements of EME

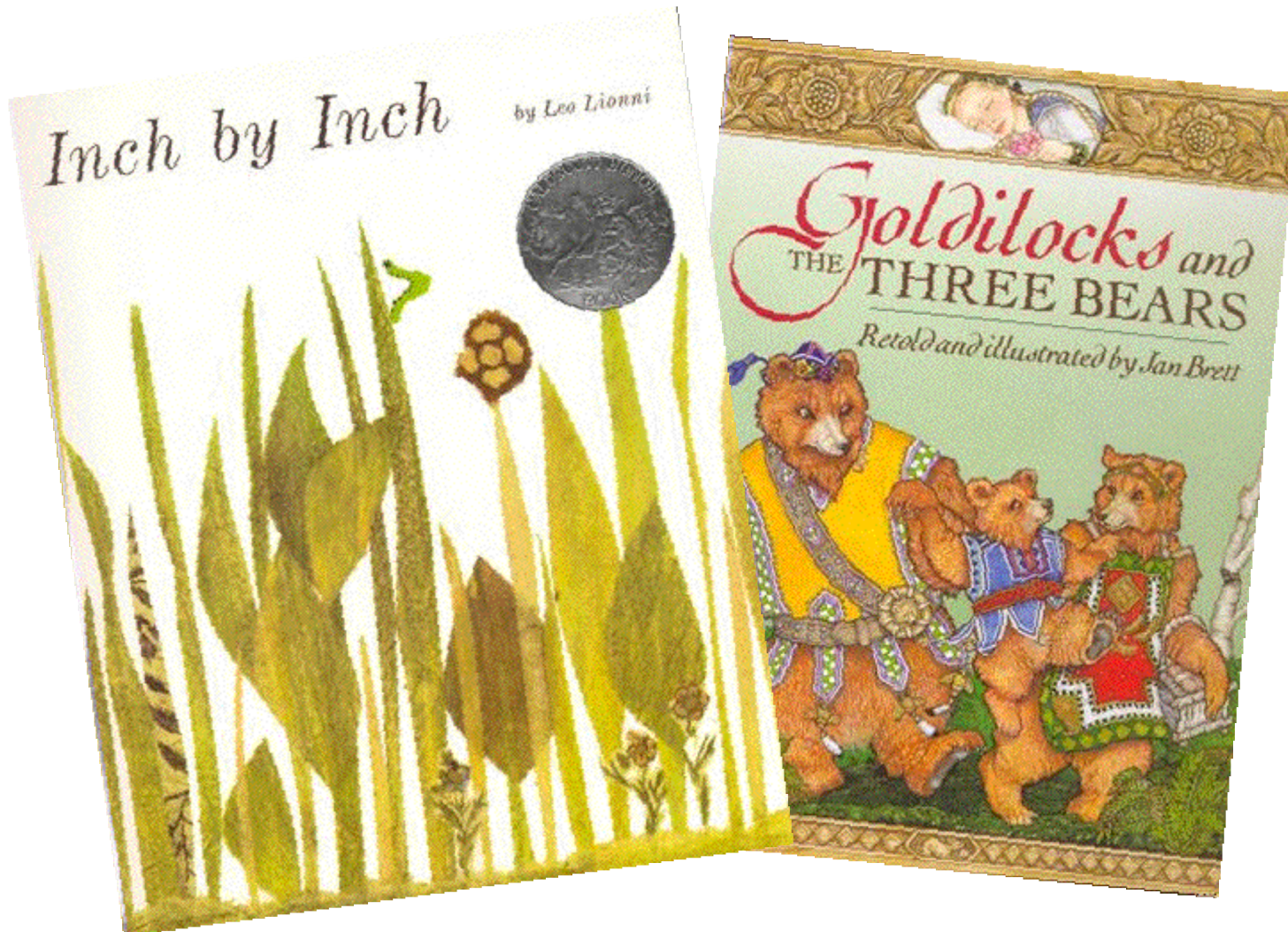


Workshop Sessions

On-Site Consultation

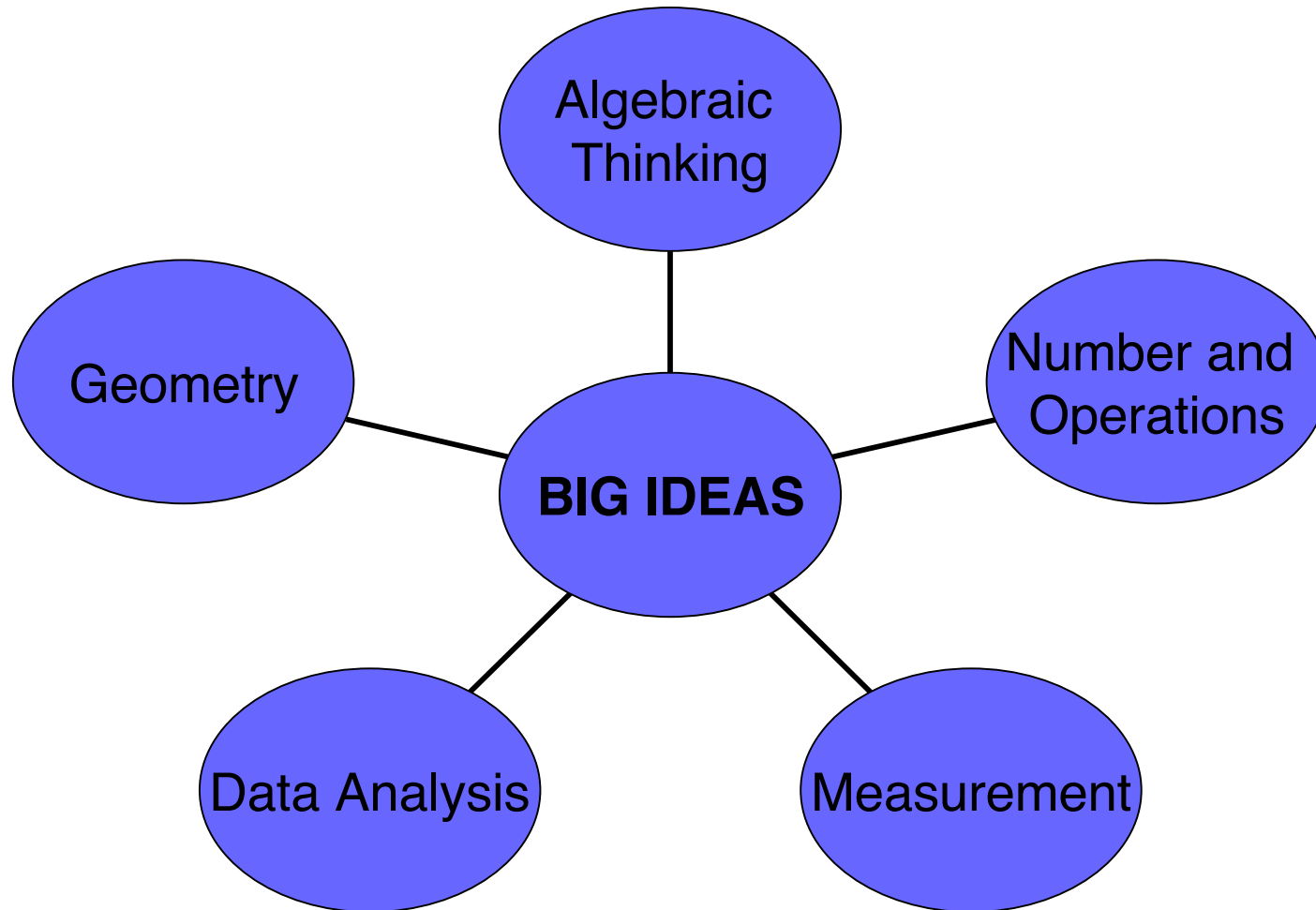


EME Combines Great Children's Literature with Early Mathematics



Content Standards of the National Council of Teachers of Mathematics

(2000)



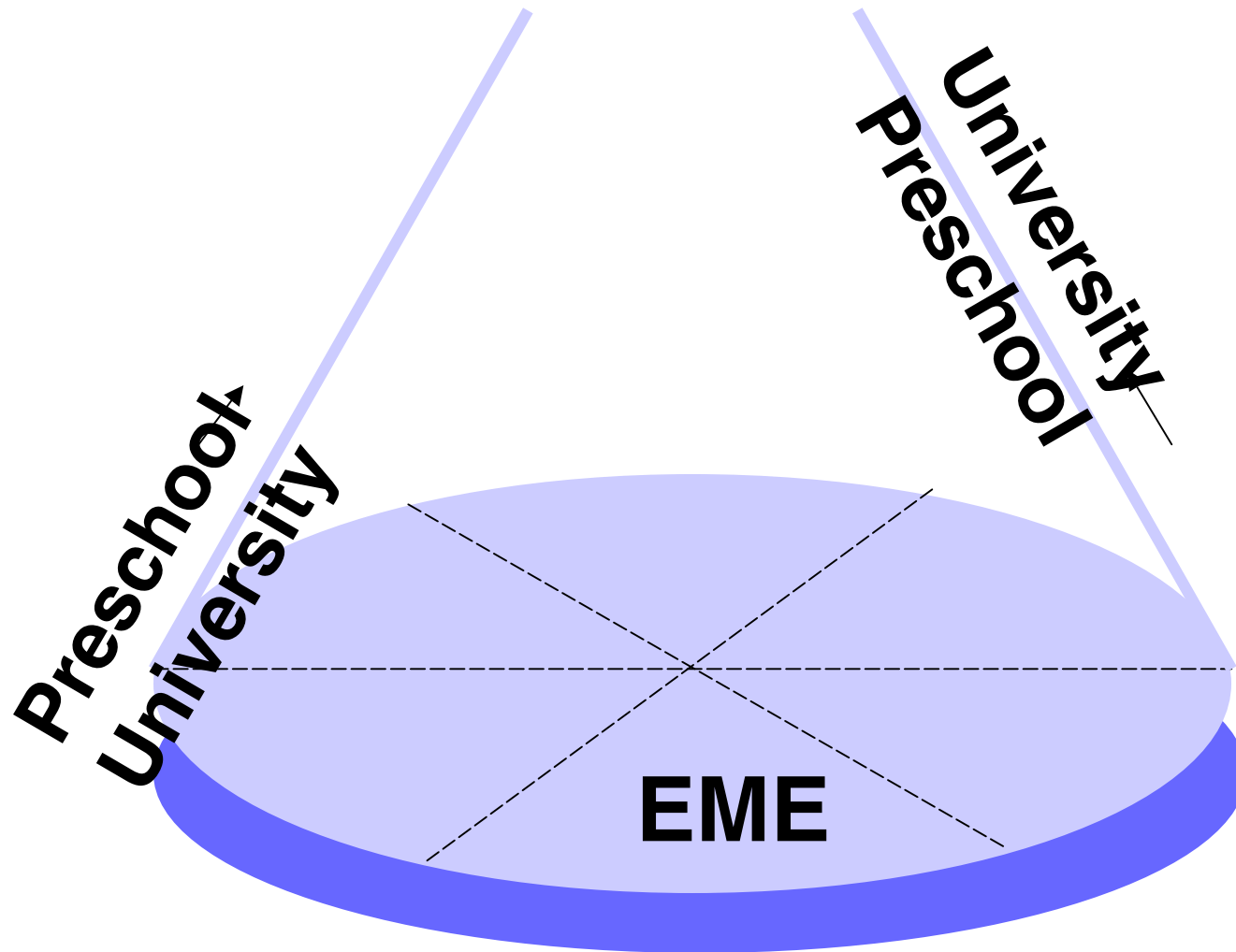
Sessions are Interactive and Hands-On



Teachers Have Lots of Opportunities to Work Together



Early Mathematics Education in Perspective



THANK YOU



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