

# Foundations in Early Learning: Mathematics

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Chicago, IL

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# Erikson Institute

## Early Mathematics Education Project

### 2007-2011

#### PreK-K Chicago Public School Teachers

- 150 schools
- 291 teachers
- 9,312 sts served/year

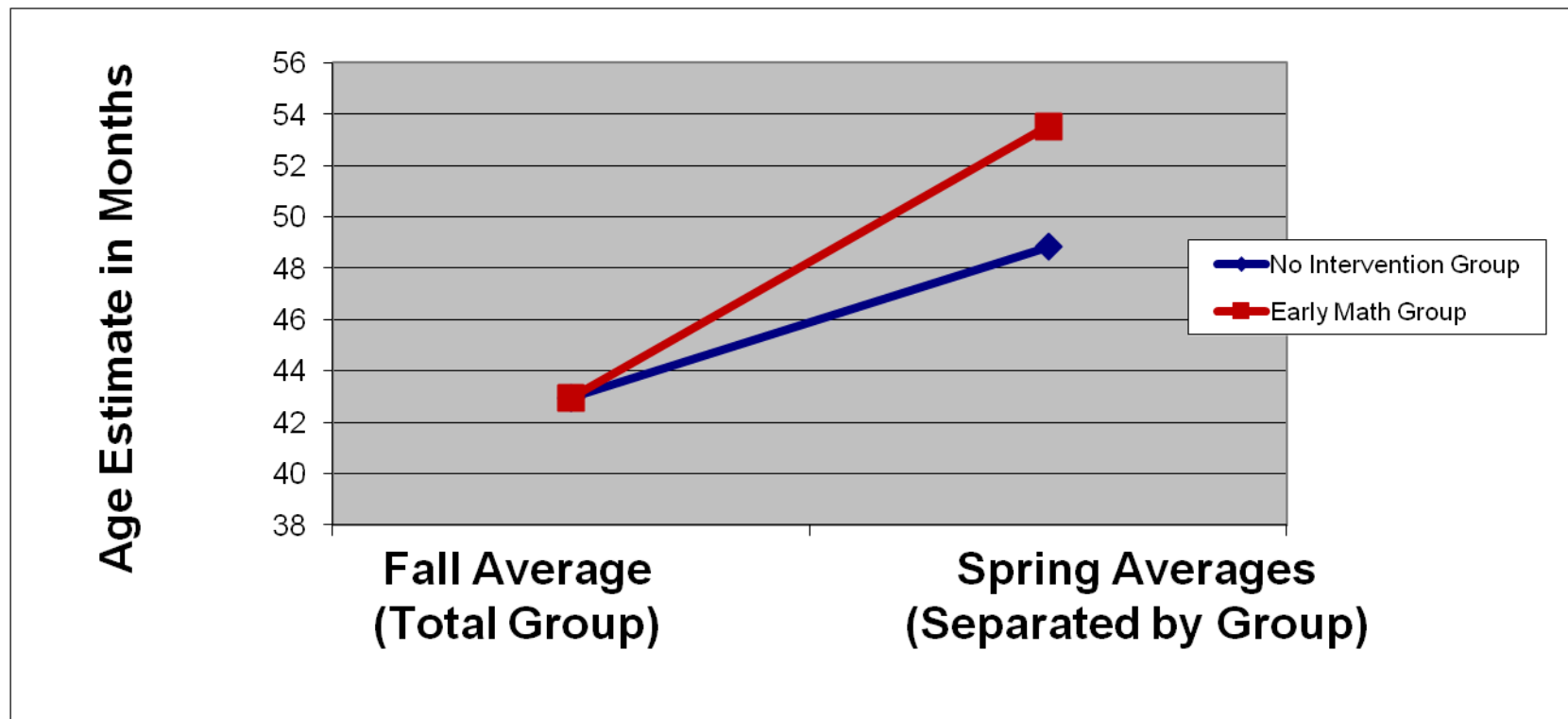
### 2010-2015

#### PreK-3<sup>rd</sup> Chicago Public School Teachers

- 8 schools
- 154 teachers
- 4,620 sts served/year

# Divergent Paths of Intervention and Comparison Groups

(only those children behind national norms at Time 1)



(Erikson EME Project, 2008-2009)

# Today we will discuss

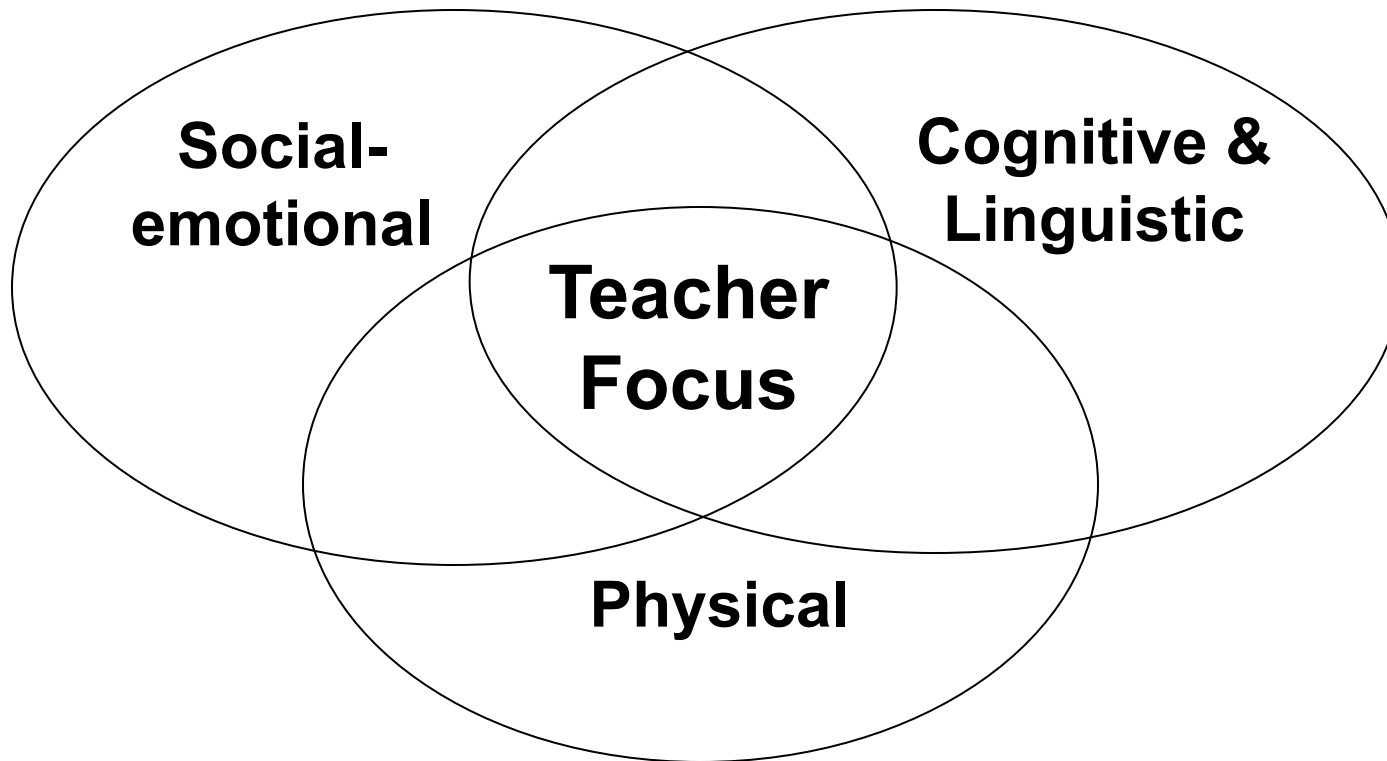
- The Whole Teacher Approach to Professional Development

AND

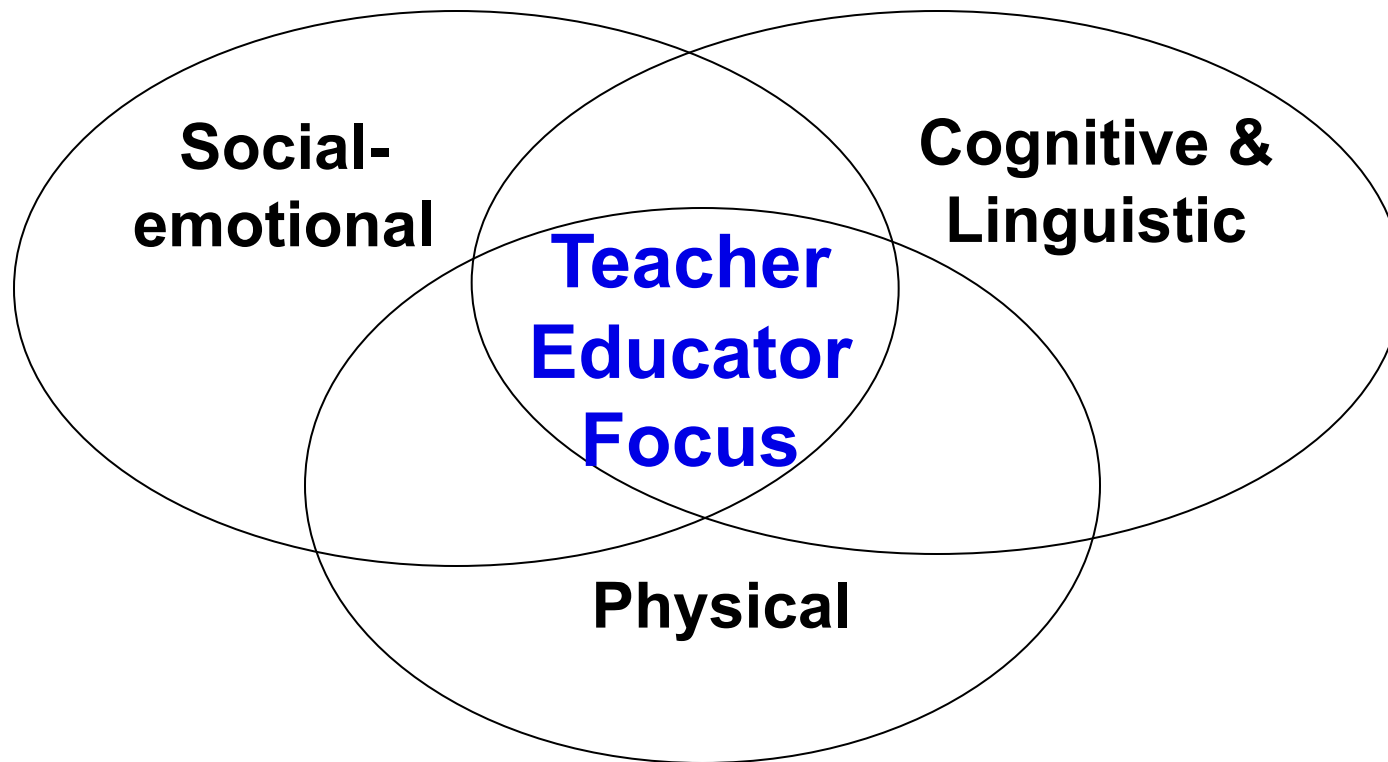
- Big Ideas in Early Mathematics Teaching

# **The Whole Teacher Approach to Professional Development**

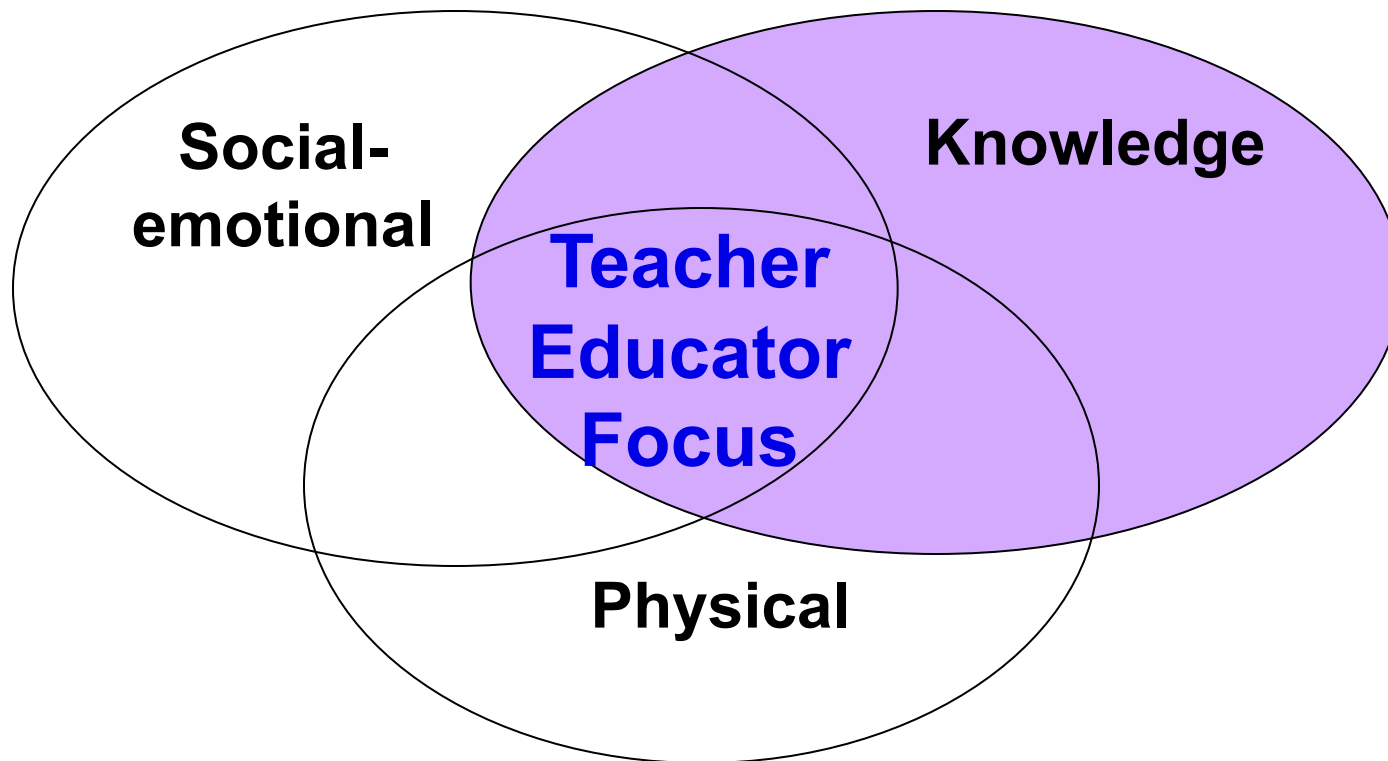
# “WHOLE CHILD” DEVELOPMENT



# “WHOLE TEACHER” DEVELOPMENT

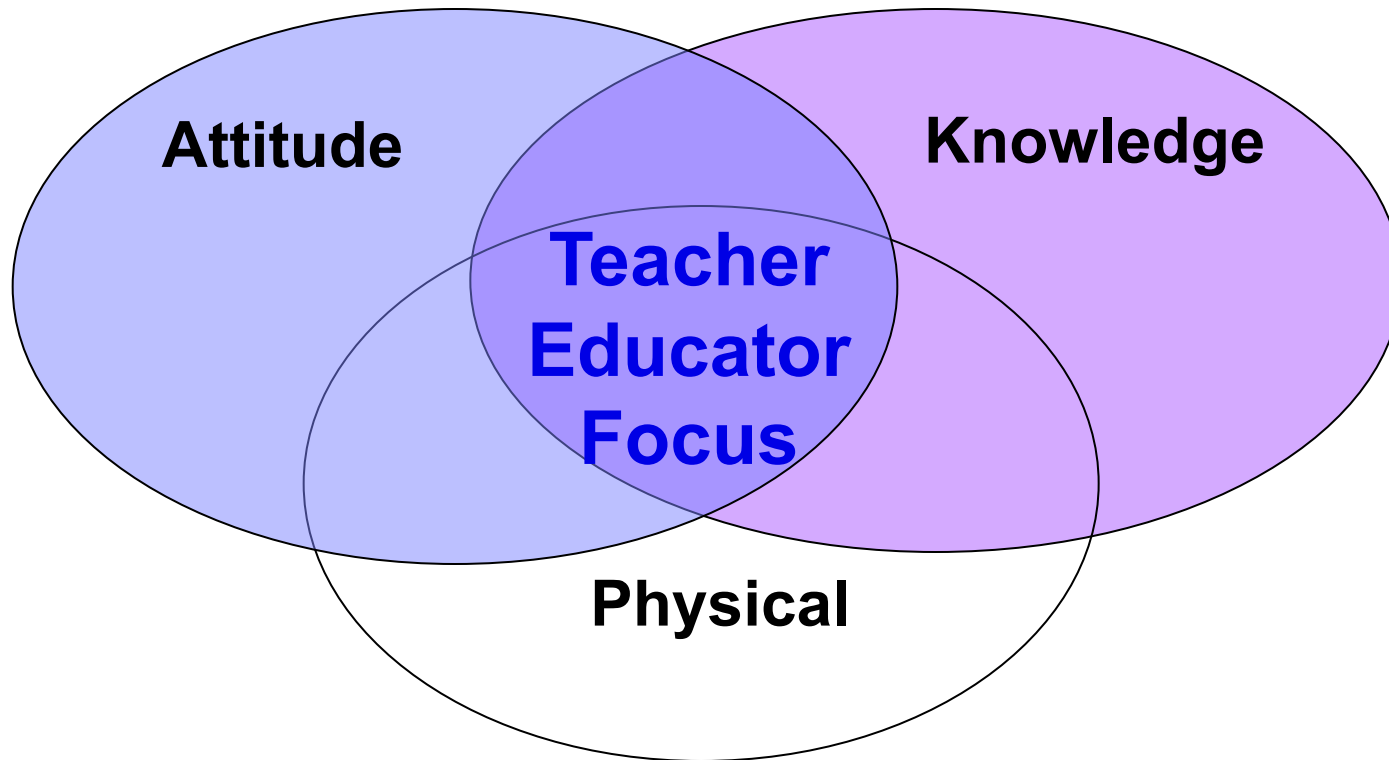


# “WHOLE TEACHER” DEVELOPMENT

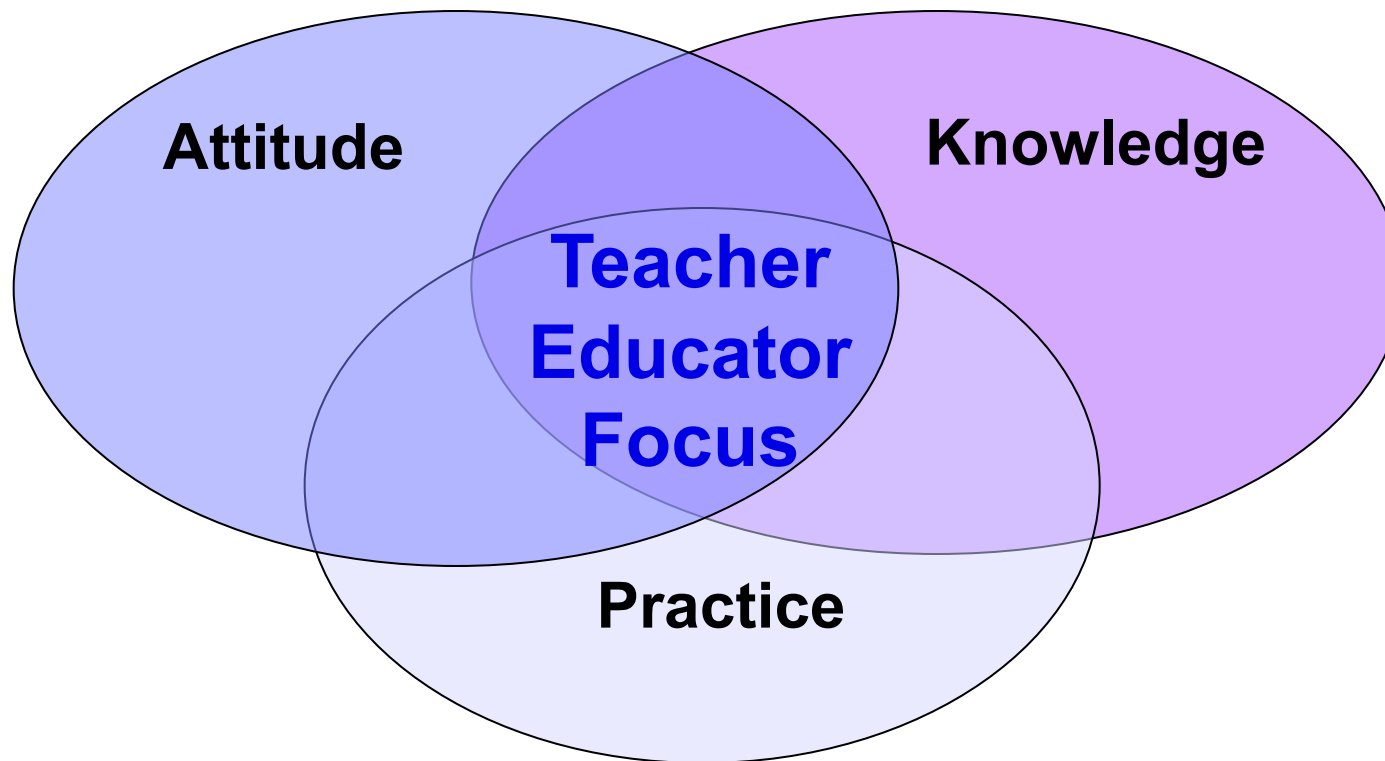




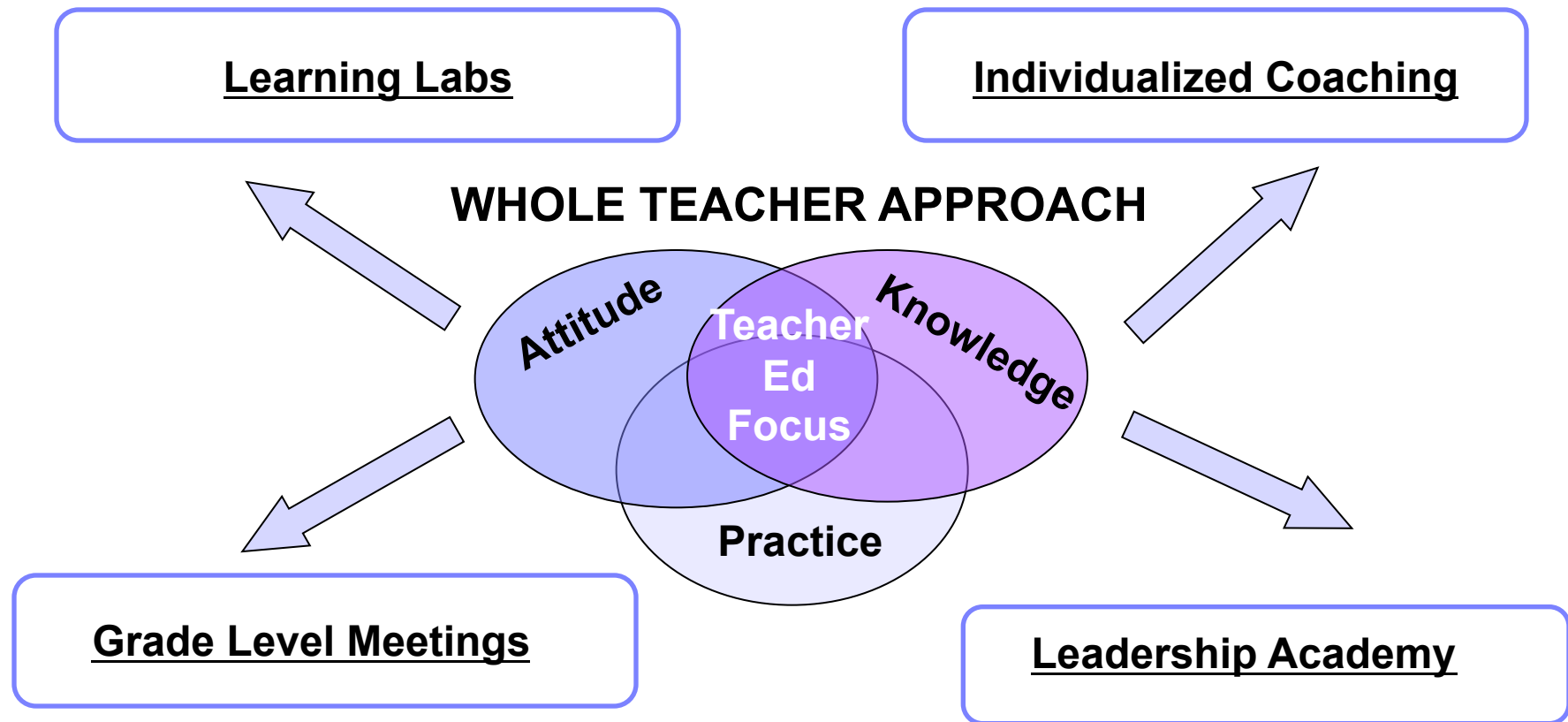
# “WHOLE TEACHER” DEVELOPMENT



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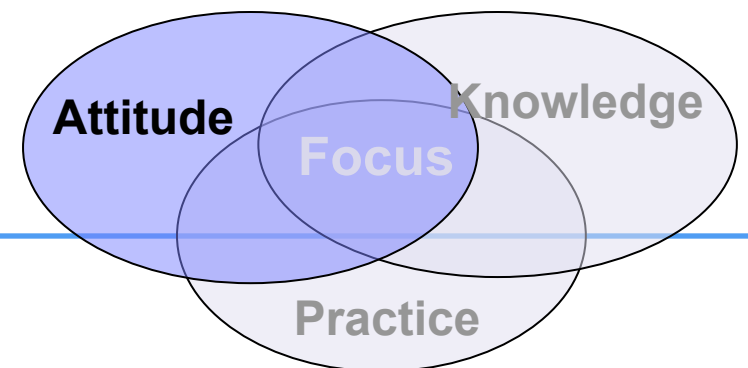


# Professional Development Components and Conceptual Framework

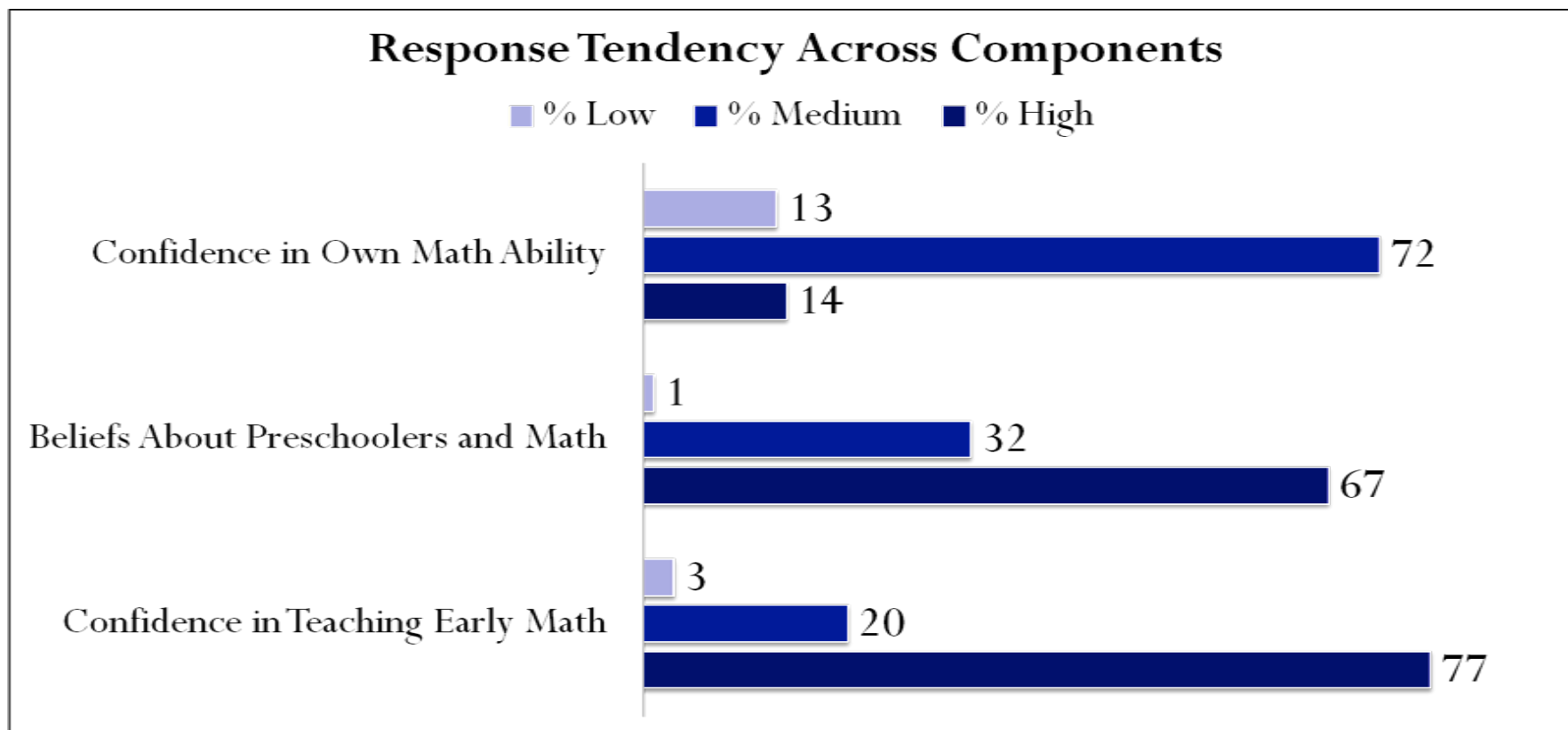


# Why is Teacher Attitude Important?

- Teacher attitudes closely related to knowledge acquisition and classroom practices (Chen & McCray, 2012; Pajares, 1992,1996; Vartuli, 2005)
- Attitude predicts effort and positive mindset of teachers



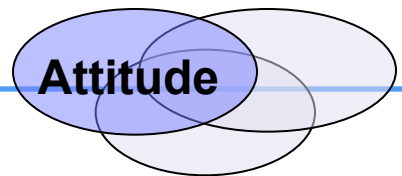
# Components of Teacher Attitude about Early Math



(Sparr, Chen, & McCray, 2010)

# Relationships between Attitudinal Components

Spearman Correlations		
	Beliefs About Preschoolers and Math	Confidence in Teaching Early Math
Confidence in Own Math Ability	0.02	0.29**
Beliefs About Preschoolers and Math		0.03
<i>Note: **Correlation is significant at <math>p &lt; .01</math></i>		



# Addressing Teachers' Attitudes in PD

- Build good math instruction off teachers' strengths
- Simultaneously encourage collaborative fun and mathematical excellence
- Ensure repeated opportunities to meet, allowing the development of a real learning community

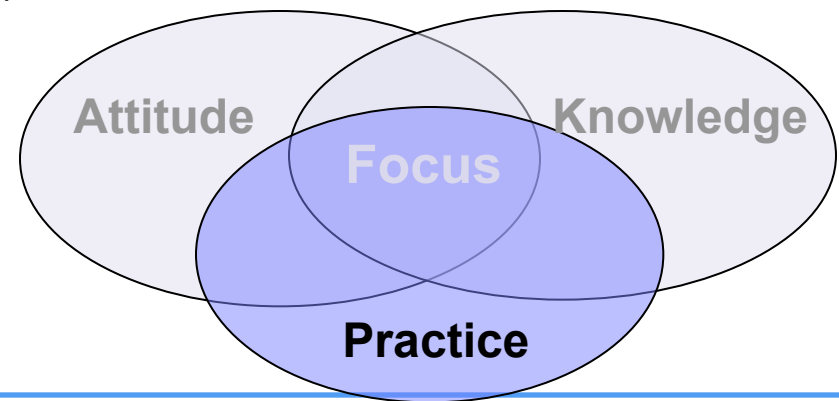


Attitude

# Why is Attention to Practice Important?

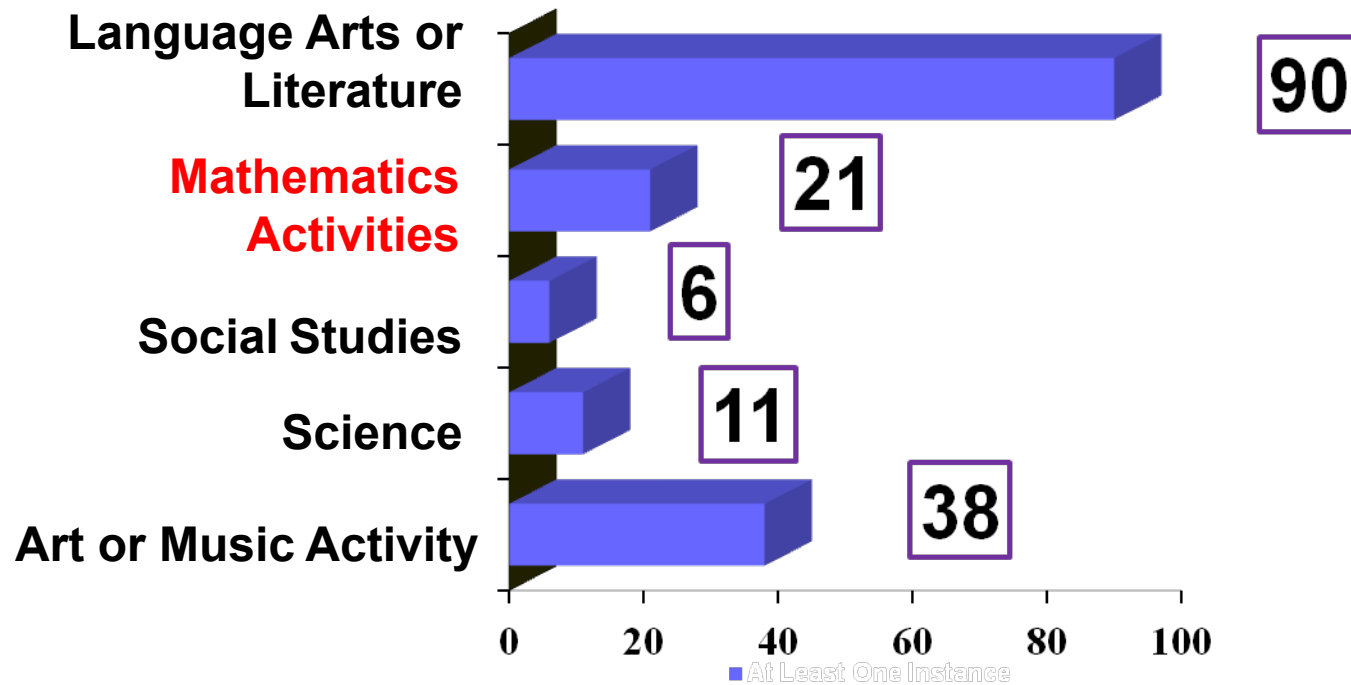
- Presents new challenges requiring adaptation
- Provokes both knowledge internationalization and knowledge construction
- Time and support for practice is key to whether professional development succeeds or fails

(Borko, 2004; Elmore & Burney, 1999)



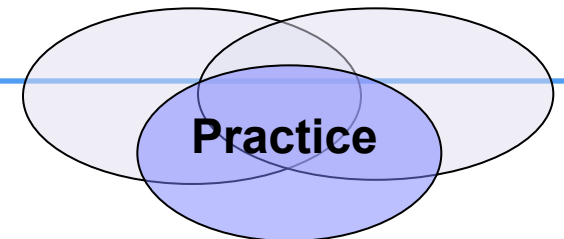


# Mathematics Teaching in Early Childhood Classrooms



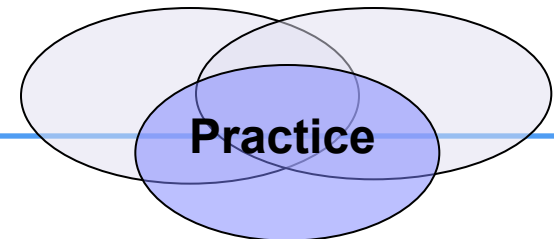
**Mathematics activities take place in only 21 percent of early childhood classrooms on a given day**

(Chicago Program Evaluation Project, 2007)



# Addressing Teachers' Practice in PD: Use of a “Research Lesson”

- Group study of a research lesson
- Planning to tailor the lesson to your classroom
- Discussion of how the last research lesson went, including the use of documentation, such as photos, children's work, or quotes of children's speech

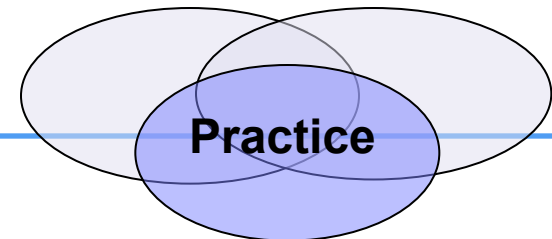


# Addressing Teachers' Practice through Coaching

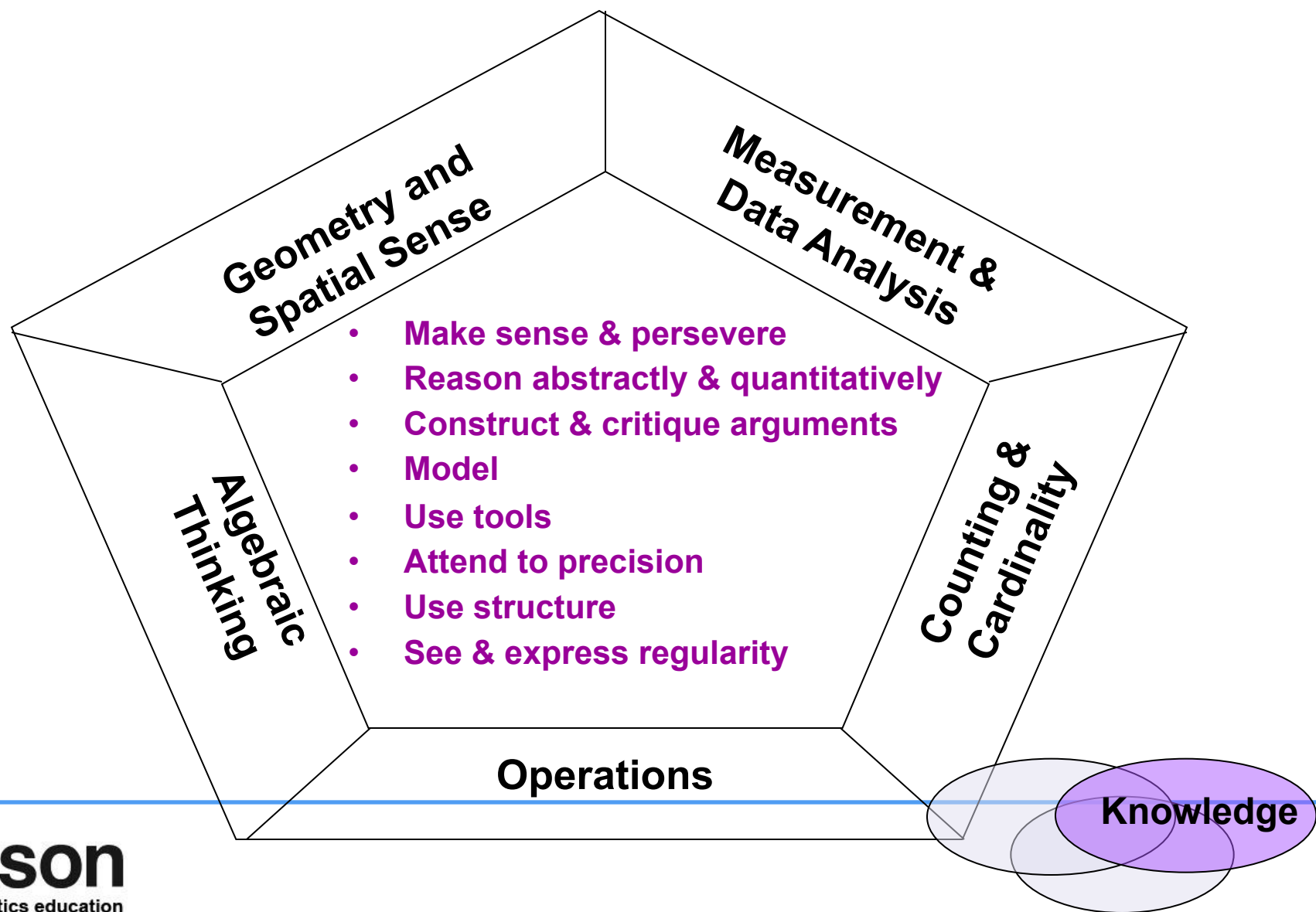
- Coaches utilize a plan-observe-reflect coaching cycle; videotape observations for later viewing with teachers



- Coaches facilitate school-based grade level groups



# Addressing Mathematics Content Knowledge: Common Core State Standards

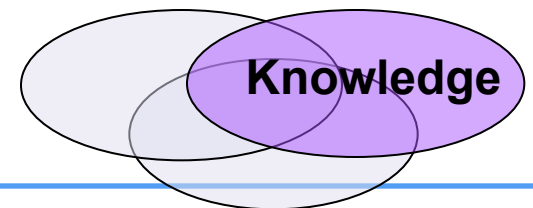


# **Big Ideas In Early Mathematics Teaching**

# Helping Teachers SEE Early Math

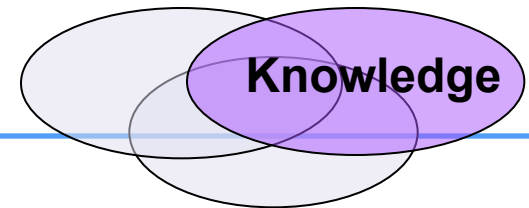
The BIG IDEAS are concepts that:

- Are central to a content area
- Present developmentally appropriate knowledge and challenges for children
- Teachers can use to guide curriculum choices



# A Big Idea in Numerosity and Number Sense

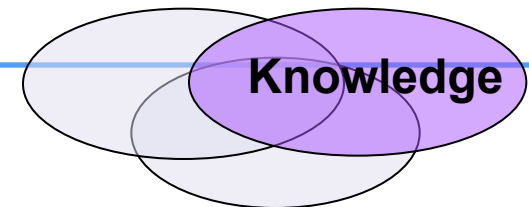
- Quantity is an attribute of a set of objects and we use numbers to name specific quantities.



3 elephants  
might seem  
obviously bigger  
when compared  
to 3 mice



- If you used the attribute of *size*
- BUT for the attribute of *number/numerosity* they are identical

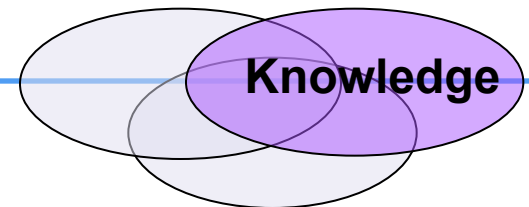




# A Collection Can Have Many Attributes

## Roses

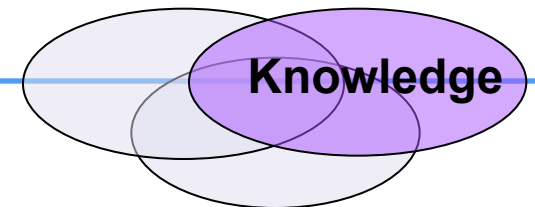
- Red color is an attribute
- Round shape is an attribute
- Sweet smell is an attribute
- Quantity is another attribute: there are THREE roses



# Problems with Naked Numbers

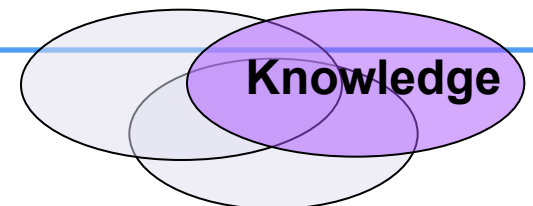


- The problem with arithmetic is that it is often presented as “naked numbers.”



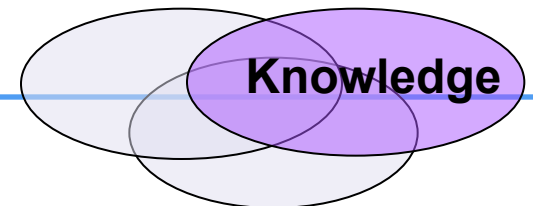
# Problems with Naked Numbers

- Naked Numbers don't invite conversation
- Naked Numbers look like nouns
- Presenting number as an ATTRIBUTE of a set (an adjective) helps children develop a meaningful understanding

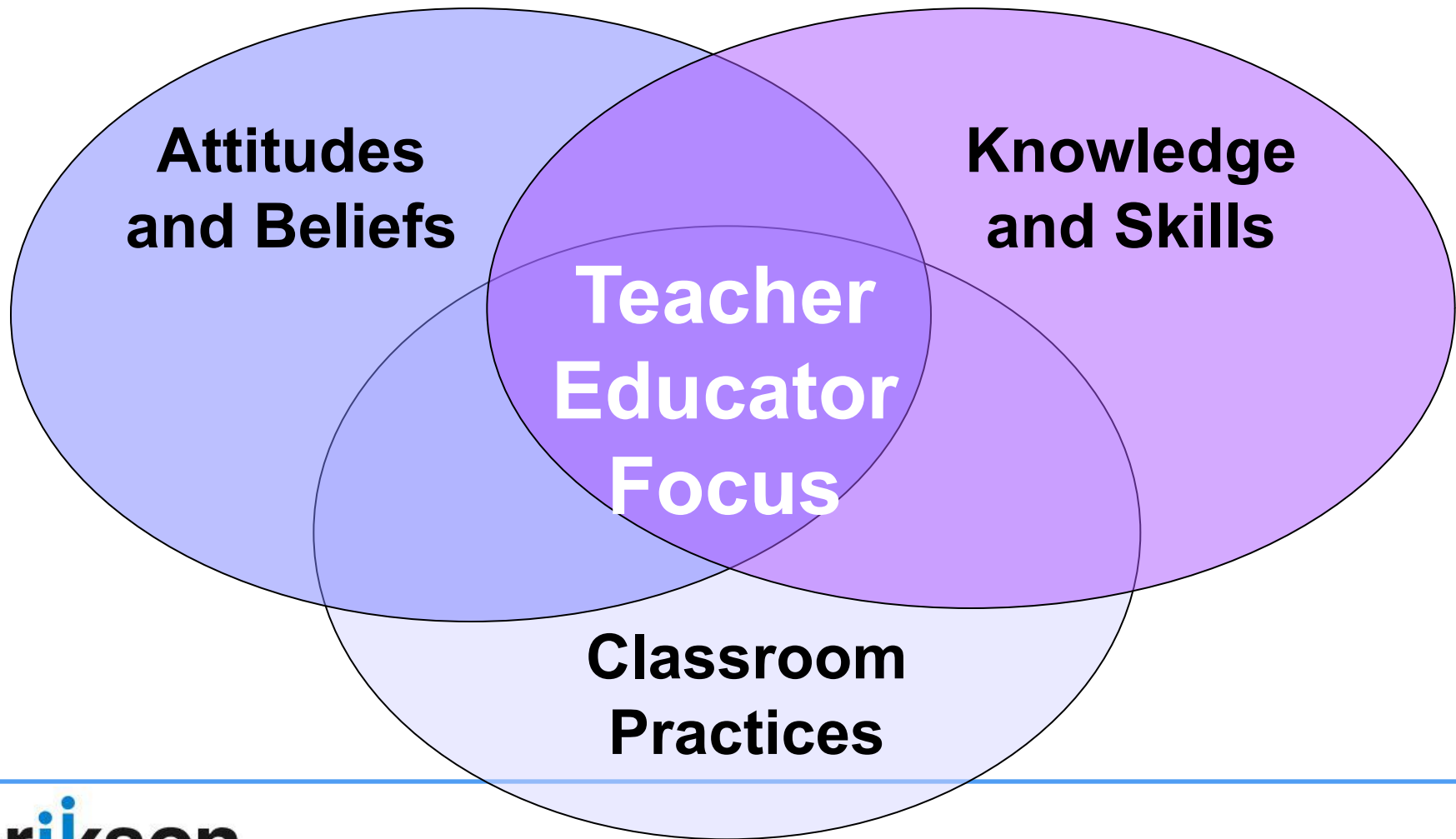


# How do the **Big Ideas** help teachers?

- **Big Ideas** help teachers **focus & clarify** their **goals for children's learning**.
- **Big Ideas** help teachers be more **flexible & responsive** concerning how children are **actually thinking about & doing math** in their classrooms.



# The Whole Teacher Approach to Professional Development



# Take-away Messages

- Explicitly addressing attitudes, practice, and knowledge through each PD component enhances effectiveness
- Giving teachers Big Ideas is like teaching them to fish – Big Ideas are useful regardless of curriculum

Thanks so much!

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