

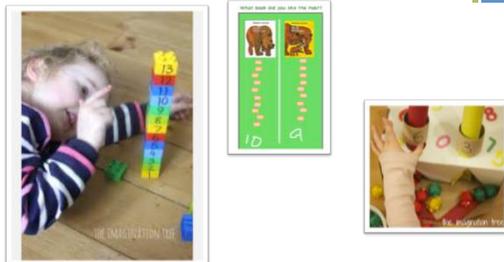
Implementing the Big Ideas of Early Childhood Mathematics



33rd Annual KDEC Conference
March 5/6, 2015

Becky Lanier, ECSE Teacher - NCKSEC
Janet Reynolds, EC Teacher - USD 110
Jennifer Oborny, ECSE Teacher - USD 428
Chelie Nelson - TASN -KITS

Kansas Early Learning Standards 2013 Revision



Big Ideas of Mathematics and the Standards

NCTM Curricular Focal Points	Standards
<ul style="list-style-type: none"> Number and Operations Algebra Geometry Measurement Data Analysis 	<ul style="list-style-type: none"> Counting and Cardinality Operations and Algebraic Thinking Geometry Measurement and Data

* Curricular Focal Points- NCTM and NCR

Changes in Math Content

- Switched from a skill based learning to a conceptual based learning.
- Want children to move from knowing numbers, to understanding numbers and their complexity and relationship. The same is true for shapes, it is no longer about naming shapes, but rather describing their attributes and how they are composed.



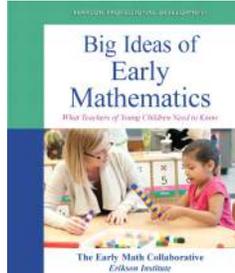
Developmental/Content Area: Mathematical Knowledge

Standard 1: Develops understanding of number concepts and numerical operations

Standard 2: Develops understanding of numbers

Grade	Indicator	Indicator Description
Pre-K	PK1	Spontaneously counts for own purposes
	PK2	Demonstrates an understanding that the last number spoken represents the entire set (i.e., counts five blocks on the table and says, "There are five blocks.")
	PK3	Spontaneously counts for own purposes
	PK4	Demonstrates an understanding that the last number spoken represents the entire set (i.e., counts five blocks on the table and says, "There are five blocks.")
K	K1	Counts objects in order to determine the number of objects
	K2	Understands that the last number named tells the total number of objects counted
	K3	Counts objects in order to determine the number of objects
	K4	Understands that the last number named tells the total number of objects counted

Big Ideas of Early Mathematics



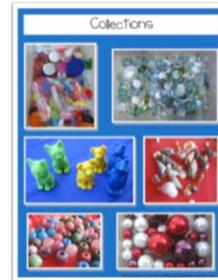
Erikson Institute Early Math Collaborative. (2014). *Big ideas of early mathematics: what teachers of young children need to know*. Boston: Pearson.

+ KS Early Learning Standards Alignment with Big Idea Topic Areas

Common Core State Standards	Big Idea Topic Areas
Counting and Cardinality	Sets Number Sense Counting
Operations and Algebraic Thinking	Number Operations Pattern
Measurement and Data	Measurement Data Analysis
Geometry	Spatial Relationships Shapes

+ Sets

Using Attributes to Make Collections



+ Big Ideas we want children to understand about Sets

1. Attributes can be used to sort collections into sets
2. The same collection can be sorted in different ways
3. Sets can be compared and ordered



+ Examples



+ Activities for Exploring Sets

- **Exact Matching** – *Find My Match*
- **Sorting by a Single Attribute** – *What's My Rule?*
- **Binary Sets** – *People Sort*
- **Multiple Sets** – *People Sort by multiple attributes*
- **Compare Sets** – *What's more/most?, What kind of shoes did we wear today?*

+ Number Sense

Developing a Meaningful Sense of Quantity

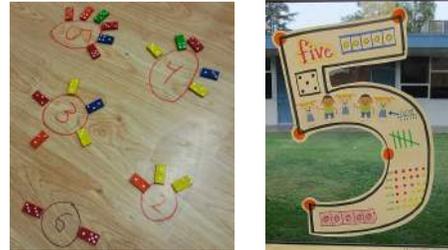


+ Big Ideas we want children to know about Number Sense

- Numbers are used in many ways, some more mathematical than others
- Quantity is an attribute of a set of objects and we use numbers to name specific quantities
- The quantity of small collection can be intuitively perceived without counting (Subitizing)



+ Examples



+ Activities for Developing Number Sense

- Connecting Number Words to Objects –
 - Give me a Big 3 and a Little 3
 - Number Scavenger Hunt
 - Making Ten Frames
- Developing a Visual Number Sense
 - Name that Number
 - Subitizing Games
- Building a Sense of Magnitude
 - Create a Number Line
 - Number line jump

+ Counting

More than just 1, 2, 2



+ Big Ideas we want children to know about Counting

- Counting can be used to find out “how many” in a collection
- Counting has rules that apply to any collection



+ Examples



+ Implications for Teaching

- Full rational counting with a strong grasp of cardinality up to 10 can take children from 2 to 3 years to develop
- No Naked Numbers
- Stable Order Principle
- One to One Correspondence
- Order Irrelevance
- Cardinality – understanding the last number counted tells how many

+ Number Operations

Understanding Operations Tell a Story



+ Big Ideas we want children to know about Number Operations

- Sets can be changed by adding items (*joining*) or by taking some away (*separating*)
- Sets can be compared using the attributes of numerosity, and ordered by *more than*, *less than* and *equal to*.
- A quantity (whole) can be decomposed into equal or unequal parts; the parts can be composed to form the whole



+ Implications for Teaching

Problem Situations	Children's Counting Strategies
<ul style="list-style-type: none"> ■ Changing Situations <ul style="list-style-type: none"> ■ How many now? – joining and separating ■ Comparison Situations <ul style="list-style-type: none"> ■ Which one has more/fewer? ■ How many more/fewer? ■ Part/Whole Situations <ul style="list-style-type: none"> ■ How many in the whole? ■ How many in one part? 	<ul style="list-style-type: none"> ■ Counting All ■ Counting On ■ Counting Back From ■ Matching/comparing ■ Count Difference

+ Patterns

Recognizing Repetition and Regularity



+ Big Ideas we want children to know about Pattern

- Patterns are sequences (repeating or growing) governed by a rule; they exist both in the world and in mathematics
- Identifying the rule of a pattern brings predictability and allows us to make generalizations
- The same pattern can be found in many different forms.



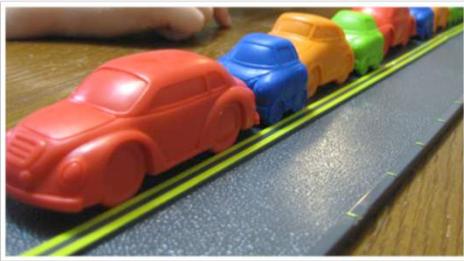
+ Examples



+ Implications for Teaching Patterns

- Present at least 3 iterations of the unit of repeat
- Describe and discuss patterns to build understanding – *help children verbalize their patterns*
- Explore patterns in the environment
- Extend patterns to movement and auditory experiences

+ Measurement Making Fair Comparisons

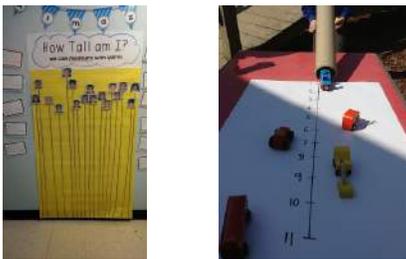


+ Big Ideas we want children to know about Measurement

- Many different attributes can be measured, even when measuring a single object
- All measurement involves a "fair" comparison
- Quantifying a measurement helps us describe and compare more precisely



+ Examples



+ Big Idea/Important Questions

- What kind of bigger is it?
- How can we compare?
- How can we make it fair?
- How much bigger is it?

+ Data Analysis

Asking Questions and Finding Answers



+ Big Ideas we want children to know about Data Analysis

- The purpose of collecting data is to answer questions when the answers are not immediately obvious.
- Data must be represented in order to be interpreted, and how data are gathered and organized depends on the question.
- It is useful to compare parts of the data and to draw conclusions about the data as a whole.



+ Examples



Pet	Tally Marks	Number
	## ##	10
		4
	##	6

+ Ideas for Data Analysis

- Do inventories of classroom materials
- Explore Data about the children and their lives
 - How many children came wearing gloves
 - How many had mittens
 - How many children were absent
- Do surveys that are connected to classroom investigations
- Conduct Fact Finding Surveys along with Preference Surveys
- Represent Data in multiple ways
 - Object graphs
 - Pictographs
 - Bar Graphs
 - Tally Charts

+ Spatial Relationships

Mapping the World Around Us



+ Big Ideas we want children to know about Spatial Relationships

- Relationships between objects and places can be described with mathematical precision.
- Our own experiences of space and two-dimensional representation of space reflect a specific point of view.
- Spatial relationships can be visualized and manipulated mentally



+ Examples



+ Activities that Build Understanding of Spatial Relationships

- Blocks and Construction Materials
- Movement Songs and Games
- "Where is" games
- Obstacle Courses and Mapping Activities
- Puzzles

+ Shapes Developing Definitions



+ Big Ideas we want children to know about Shapes

- Shapes can be defined and classified by their attributes
- The flat faces of solid (3-dimensional) shapes are 2-dimensional shapes
- Shapes can be combined and separated (composed and decomposed) to make new shapes



+ Example

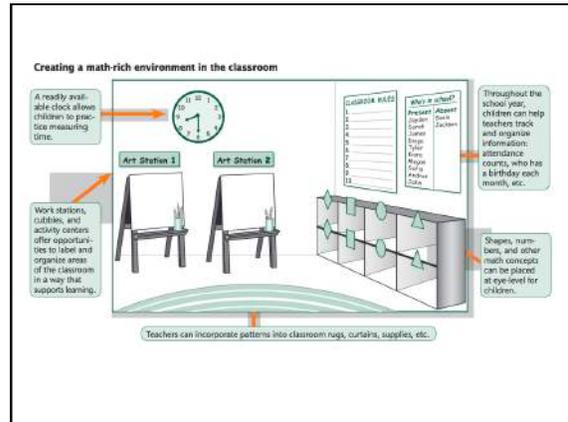


+ Implications for Teaching

- Provide a diversity of shape examples- both 2 and 3 dimensional
- Find Shapes in the Environment
- Move children toward precision
 - Triangles have 3 sides and 3 corners
 - Rectangles have 4 straight sides and 4 corners.
 - Square is a special rectangle with a 4 sides the same length
 - A baseball is a sphere and can be represented in a drawing as a circle

+ What Does Math Look Like in an EC Classroom?

- Large Groups
- Small Groups
- Embedded into Children's Self-Selected Activities



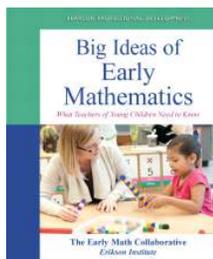
+ Key Strategic Math Teaching Practices

1. Mathematize the world around us
2. Make mathematics more than manipulatives
3. Recognize receptive understanding
4. Get mathematics into children's eyes, ears, hands and feet
5. Scaffold children to construct their own understanding

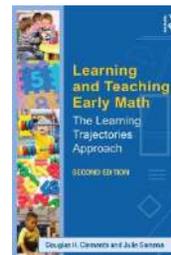
+ Early Childhood Resource Center KSKITS.ORG



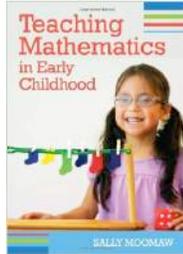
+ Resources



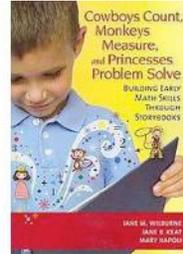
+ Resources



+ Resources



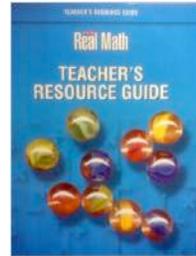
+ Resources



+ Comprehensive Curriculums



+ Curriculum

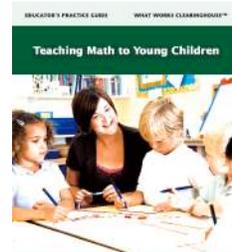


+ Online Resources



<http://readyforlearning.net/math>

+ Online Resources



http://ies.ed.gov/ncee/wwc/pdf/practice_guides/early_math_pg_111313.pdf

+

A Special Child

By Maggie Burhite

Little child, little child as you lie sleeping - I wonder what secrets you are keeping.
Those long silky lashes and features so fine - I'm so blessed you are a child of mine.
Teachers, oh teachers, my child's coming to you - I pray you will think he's special - I do!
Will you bring out those little secrets he's keeping inside - Will he feel confidence, self-worth and pride?
Will you see him as an individual - unique in every way - Not just a name on a paper at the end of the day.
Will you encourage his mind to soar and take flight - or will one of you quietly turn out the light.
I guess what I really want him to be is as special to you as he is to me.

- Mother

+

Questions?

