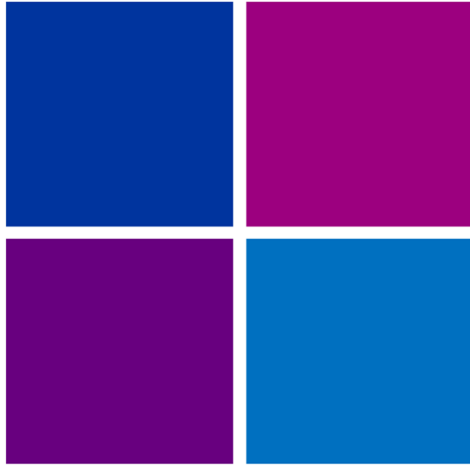




Let's Talk: Early Mathematics Development



Excerpt: Integrating Curriculum Workshop





Early Mathematics Development

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“Children have an intuitive interest and understanding of mathematical concepts long before they enter school. They explore their worlds, sorting, classifying, comparing, and contrasting objects through playful and daily activities.”

Nurturing Knowledge (Neuman & Roskos, 2007)



Quote from *Nurturing Knowledge* (Neuman & Roskos, 2007).



Early Mathematics Development: Overview

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Key Concepts	You Will Learn
<ul style="list-style-type: none">■ Foundations in Early Mathematics■ Reasoning and Problem Solving■ Mathematics Vocabulary■ Mathematics Manipulatives☑ Curriculum Integration	<ul style="list-style-type: none">■ Ways to build solid <i>foundations</i> in: numbers & operations, patterns & relationships, measurement, and data collection & analysis■ Ideas to promote children's <i>problem solving abilities</i>■ Activities that build <i>mathematics vocabulary</i>☑ How to enhance concepts in <i>mathematics through curriculum integration</i>

☐ Foundations in Early Mathematics

- Numbers and Operations
- Patterns and Relationships
- Measurement
- Data Collection and Data Analysis

☐ Reasoning and Problem Solving

- ☐ Mathematics Vocabulary
- ☐ Mathematics Manipulatives
- ☐ Curriculum Integration

+ Early Mathematics Development: Provide Opportunities

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Early Mathematics Development Involves :

Providing a variety of opportunities for young children to explore concepts in mathematics.

What type of opportunities
promote early mathematics
development?



Children are ready to learn math concepts very early in life; waiting until they are “ready” to understand math is not necessary. Children need to have opportunities to investigate the world mathematically.

+ Fostering Early Mathematics Development

Types of Opportunities to Promote Math

- ❑ Surrounding children with opportunities to recognize numbers
- ❑ Make counting meaningful
- ❑ Provide numerous ways for comparing numbers
- ❑ Involve children in concrete problem-solving
- ❑ Continually “speak math” to young children
- ❑ Engage children in playing with different shapes (sorting, creating new shapes, recognizing shapes in child’s environment)

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+ Fostering Early Mathematics Development

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Mathematics Supportive Learning Environment:

- ❑ Mathematics Centers/Play
- ❑ Classroom Resources
 - * Books
 - * CD-Roms
 - * Toys
 - * Manipulatives
- ❑ Talking About Mathematics
- ❑ Circle Time

Preschoolers are typically curious, eager, and active explorers within their learning environment. Teachers can introduce, encourage and stimulate mathematical thinking by creating a classroom and/or child care setting to become a supportive learning environment for early mathematics development. The following list includes ways of providing an early learning environment that supports mathematics:

- ❖ Mathematics Centers/Play
- ❖ Classroom Resources
 - * Books
 - * CD-Roms
 - * Toys
 - * Manipulatives
- ❖ Talking About Mathematics
- ❖ Circle Time Ideas

Handout #1: Creating a Mathematics Environment

+ Supportive Math Environment

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Early childhood environments can be created to support development in mathematics.
Consider including the following:

- ❖ Math table located near shelves where math manipulatives are stored and available for children
- ❖ Labeled block area with clipboards/pencils for children to draw design plans, measuring tapes, and small disposable cameras for children to photograph block projects
- ❖ Water and/or sand table with measuring containers available
- ❖ Bookcases with picture books relating to math concepts
- ❖ Open shelves for storing math puzzles and simple math board games
- ❖ Posters (refresh regularly) relating to math concepts/ideas
- ❖ Student created charts and/or photos with visual representations of data collected by children or problem-solving projects
- ❖ Growth chart for children to record height
- ❖ Calendar that uses patterns for days-of-the-week or patterns used for counting school days
- ❖ Celebrations for special number events (days attending school that have zeros – “Zero the Hero” or 100th Day of School)
- ❖ Class rugs with numbers and shapes
- ❖ Outside thermometer for children to record the temperature daily
- ❖ Laminated cards with math vocabulary words at the class writing center available for children to use
- ❖ Word wall for special math vocabulary words
- ❖ Technology area with computer/math programs with easy access for all children



Curriculum Integration

(definition)

Curriculum integration would imply learning activities designed to help students build connections between academic subject areas. Mathematics would be integrated throughout the day in a variety of other aspects of the classrooms.



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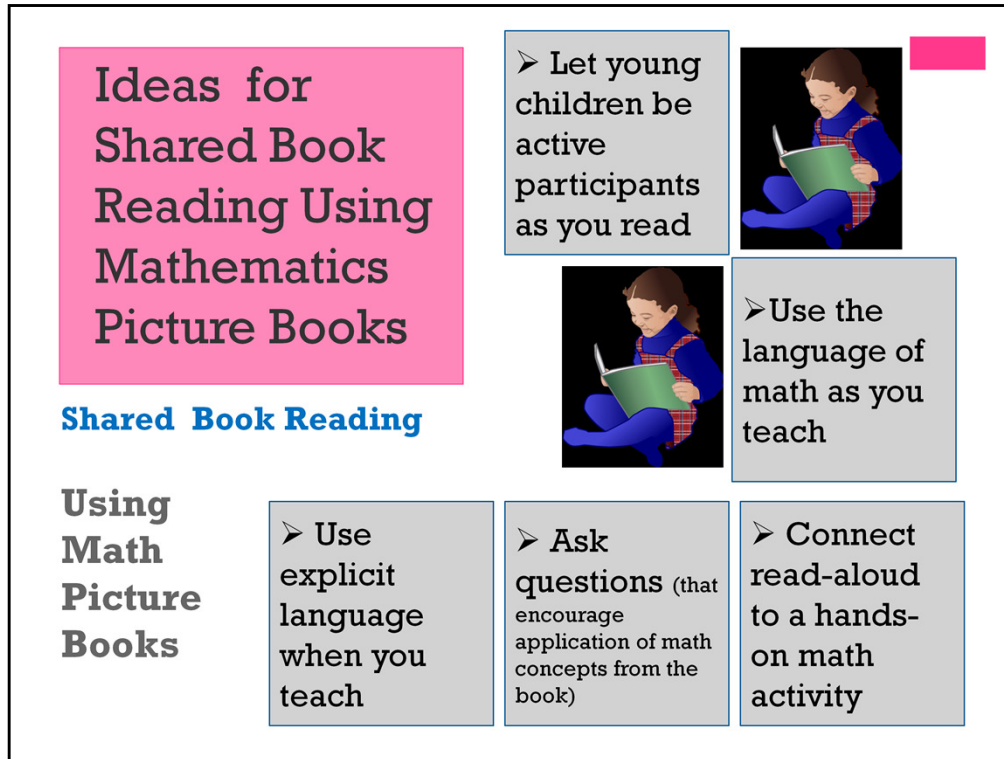
Integrating Math & Reading

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There are many superb picture books that help young children explore a variety of mathematics concepts.



Refer to Handout #9: Picture Books for Math



When you read a math picture book aloud, assist preschoolers in the following ways:

➤ **Let young children be active participants as you read.** Children love to participate during the reading of the story. Ask questions such as, “*How many ducks will be left when that one flies away?*”

➤ **Use the language of math as you teach.** Math read-alouds provide an excellent opportunity to use a variety of math words as the story is being discussed together. An example of this would be: “*She is **measuring** that dog in the picture; which dog do you think is the **longest** and which one do you think is the **shortest**.*”

➤ **Use explicit language when you teach.** Math picture books can contain some key math concepts. It is helpful to make the information explicit. Example – “*This book looks like a book about fractions. The cover shows them dividing that whole pizza into parts. Let’s see what we can learn about fractions.*”

➤ **Ask questions (that encourages application of math concepts from the book).**

➤ **Connect read-alouds to a hands-on math activity.**



Shared Math Activities: Board Games

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“Age-old board games that incorporate numbers and counting have led to better understanding of numbers by young students.”

Quote from: Sean Cavanagh
(from Education Week)



A growing body of research is showing that using board games can be beneficial to strengthen skills in mathematics, especially for children from disadvantaged backgrounds (Cavanagh, 2008). Simple board games that involve counting can produce gains in understanding numbers and these gains are lasting. “Spending even a small amount of time on fun, basic board games could spark an early interest in math and produce an academic payoff later” (Cavanagh, 2008). Young children learn much through play; board games can be a great source of play and are relevant to children. Board games are also a shared activity that can give children a fun opportunity to practice math skills and reinforce concepts in a way that is tangible for children.

Handout #10: Math Games

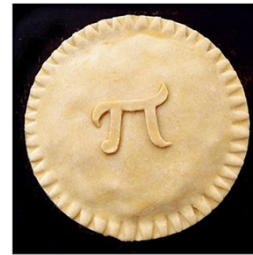


Preschool Math & Snacks

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Class baking projects, snack, and shared meal times can be extremely beneficial for reinforcing math skills and concepts.



Baking projects can reinforce the following math skills/concepts:

- ☐ Measurement
- ☐ Fractions
- ☐ Recognizing and naming numbers
- ☐ Comparing
- ☐ Time

Handout #11: Food for Thought



Shared Math Activities: Music

“What happens when you sing counting songs at group time? You make the natural connection between music and math!”

Quote from: Ellen Booth Church
(from Scholastic Early Childhood Today, 2006)



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Children can learn basic math skills through sharing songs together.

Math songs can help children develop skills in:

- ☐ Matching and comparing (rhythm, volume, and pitch)
- ☐ Patterning and sequencing (repeating patterns with rhythms and melodies)
- ☐ Counting

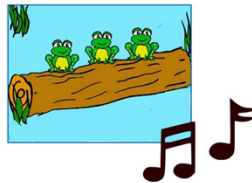


Activity

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Math Songs and Chants

- ❑ Join together in a group to sing some counting and math concepts songs/chants together.
- ❑ Discuss the benefits of sharing math songs together with young children.



Activity #9: Math Songs and Chants - Join together with singing some simple “math” songs – *Five Little Monkeys* and *Ten in the Bed*; discuss in pairs other songs for children that can be used for children to develop math skills and concepts; discuss the benefits of sharing math songs together with the children.

Handout #12: Math Songs, Rhymes, and Chants



Technology & Math Concepts

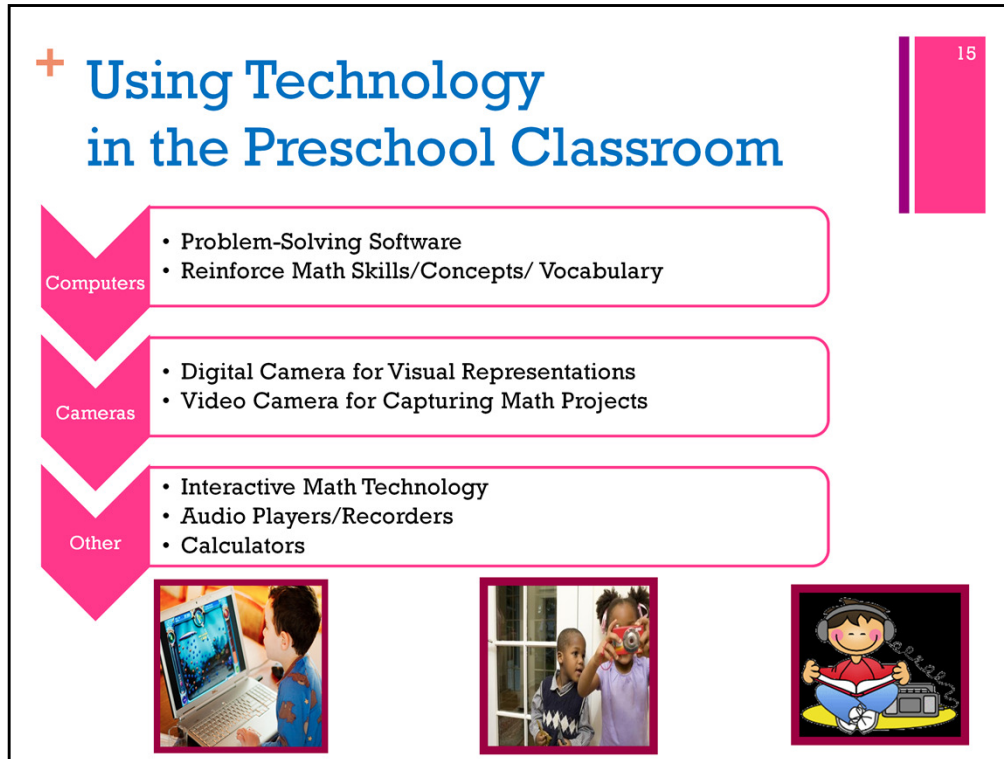
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“Students are living and learning in an age of new media. Using games to teach math concepts supports students’ needs for engaging and interactive instruction.”

-National Council of Teachers of Mathematics



Handout #13: Preschool Math Technology



Technology can be used in various ways for early mathematics development. Some of the ways for using technology include the following:

Computers: Software can be used for developing problem-solving abilities, reinforcing math skills & concepts, and building vocabulary used in mathematics. Internet can be used for math demonstration videos, free interactive math games, obtaining access to data (example – weather data/current temperatures in different areas). Note: Please check out computer use policies, obtain needed parental permission, guard confidentiality of students, and make sure Internet security features are in place.

Cameras: Digital cameras can be useful for creating visual representations of data and capturing student math projects. Video cameras can be useful for capturing the students explaining math processes, strategies, and problem-solving, as well as capturing math projects. Note: Please check school requirements for obtaining parental permission to photograph students.

Other: Interactive math technology can include math games, computerized white boards, hand-held student response system devices, and a continual host of new tools. Audio players/recorders can be used for listening to storybooks relating to math concepts and/or recording children counting, collecting data or having problem-solving conversations. Young children often enjoy exploring math with calculators, which can be great for number recognition.



Progress Monitoring

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- Assess children's math progress
 - Document children's knowledge of number concepts, one-to-one correspondence, and number and shape recognition
 - Observe math processing
 - Collect samples of work
 - Use this information to plan instruction for each child.



Handout #14: Progress Monitoring in Math



Responding to Children's Success: Portfolio

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- Documents each child's progress and changing development
 - Includes:
 - Screening measures
 - Number writing samples
 - Ongoing observation notes
 - Favorite math activities with family and friends
 - Photographs



Early Mathematics Development

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- Engaging children in meaningful activities about:
 - Numbers & Operations/Patterns & Relationships/Measurement/Data Collection & Analysis
 - Problem Solving
 - Math Vocabulary
 - Using Manipulatives
 - Integration of Math Throughout the Day

CELEBRATE
SUCCESS
in
Early
Mathematics!

