

Introduction and Overview

Connecting Literature and Math – A Component of STEM Curriculum

History of the Project

In 2012 a math curriculum titled **Connecting Literature and Math (CLAM)** was developed to support teachers in providing appropriate math experiences for children from three through five. The activities in the **CLAM** curriculum guides supported the Benchmarks in the Arkansas Early Childhood Education Framework Handbook. When the Arkansas Child Development and Early Learning Standards: Birth to 60 Months were adopted in 2016 to replace the Framework Handbook, it became necessary to revise **CLAM** to reflect the new Learning Goals which replaced the Benchmarks. As revisions and updates were being made, it was also decided to change the title of the curriculum to more accurately reflect the emphasis on a STEM focused curriculum. Thus the title of the curriculum is now **Connecting Literature and Math – A Component of STEM Curriculum**, which will continue to be referred to as **CLAM**. Although the title of the curriculum has changed, benchmarks have been converted to learning goals, and some activities have been updated, the focus remains the same; to provide appropriate math experiences for children from three through five.

Two early childhood educators, Dot Brown and Beverly C. Wright, have been involved in both the development of **CLAM** and the revisions. Dot and Beverly have Masters of Education degrees with an early childhood emphasis, plus many year of experience as instructors, trainers, monitors, evaluators, supervisors, mentors and curriculum developers. The development of **CLAM** and the revisions have been made possible through sub-contracts with the University of the Ozarks in Clarksville, a contractor with the Division of Child Care and Early Childhood Education. Shelli Henehan, Ed.D, Associate Professor/Coordinator of Assessment, UAFS School of Education/College of STEM, supervises the project.

Children and Math

Children live in a mathematical world. They see, hear and experience math all day long. Here are some examples of what they may experience:

- Clocks, phones, calendars, and keyboards with numbers
- Adults giving their phone number, their address or their credit card number
- Prices on items in the grocery store
- Questions such as “Do you want a round or a square cracker?” “Would you like a half or a whole banana for snack?” “How old are you?”
- Comments such as “The new baby next door weighed 7 pounds 2 ounces.” Or “We’ve had rain for 3 days. Maybe the sun will shine tomorrow so we can go swimming.”
- From grandma, “You get taller every time I see you. I think you’ve grown 2 inches since your fourth birthday.”

These everyday events that surround children support the domain, **Mathematical Thinking**, which is one of the nine domains of development and learning in *Arkansas Child Development and Early Learning Standards, Birth to 60 Months* adopted in 2016. The math information presented in the standards may seem beyond what many think children can understand. But children are natural mathematicians. They love to count, to compare quantities, describe shapes and sizes, and move their bodies in space. Teachers of young children are encouraged to take advantage of these interests of children by providing appropriate math materials and experiences in a positive and supportive environment.

Using the Curriculum Guides

The curriculum guides focus on strategies for providing children daily opportunities to experience mathematics through child-centered, hands-on activities as well as teacher-guided experiences. Guides begin with children's books that focus on one or more mathematical thinking learning goals and strands. Each guide extends to related experiences in the learning environment and the daily curriculum. At the end of each guide are ideas for assessment of children.

Consider CLAM as a supplement to the Arkansas approved curriculum you are currently using in order to provide children additional opportunities to achieve mathematical competence.

Creating a Math Environment

Following is a list of materials to consider when creating a child-centered, hands-on math environment in a classroom. Some of the items may be found in the center or in the home. Others can be purchased and some can be made by the teacher. Feel free to provide additional materials.

Number Concepts and Operations

- number puzzles
- counting match-ups (2 piece puzzles)
- pegs and pegboards
- counters (bears, cats, dogs, frogs, turtles, etc.)
- magnetic numerals
- number cubes (dice)
- number bingo

Algebraic Thinking

- beads and laces (patterning)
- links (patterning)
- unifix cubes (patterning)
- patterning match-ups (2 piece puzzles)
- counters of different colors (classification)

Measurement and Comparison

- pan balance scales
- ruler
- cloth tape measure
- timers
- clocks
- thermometer
- growth chart
- measuring cups and spoons
- unifix cubes

Geometry and Spatial Sense

- wood unit blocks
- tabletop blocks
- parquetry blocks and pattern cards
- geoboards
- geometric shapes (3-dimensional)
- magnetic tiles

Consider these three approaches to including math materials in the learning environment:

- Provide a math center with the majority of available math materials in the center
- Include materials in various areas of the environment rather than in a math center
- Provide both a math center and the inclusion of math materials in other areas of the environment

Assessing Children's Mathematical Thinking Skills

At the beginning of each guide are the Mathematical Thinking Domain Components and the Learning Goals that will be supported through activities in the guide. Learning goals are listed for all of the activities. At the end of each guide is a section titled **Assessment Ideas**. In this section, specific activities and/or materials in the environment that can be used to determine a child's competence in specific learning goals will be listed.

Teachers are encouraged to intentionally become involved with the children in the activities and to encourage and support them as they use the materials. Through involvement, encouragement, support and observations, a teacher can assess each child's mathematical thinking skills.

Mathematical Thinking

As previously noted, **Mathematical Thinking** is one of the nine domains of development and learning in *Arkansas' Child Development and Learning Standards, Birth to 60 months*. In the standards the domain is presented as follows:

Mathematical Thinking (Domain)

MT1. NUMBER CONCEPTS AND OPERATIONS (Domain Component)

MT1.1 Demonstrates number sense and an understanding of quantity (Learning Goal)

Number Names & Count Sequence (Strand)

Says or signs number words in order accurately with increasing ability to count from 1 to five to 10 to 20 and beyond (**Indicator spanning the 37 to 48 and 49 to 60 month age ranges**)

There are four Domain Components in the Mathematical Thinking Domain. Each component is listed below, followed by the learning goals, the strands and the related concepts and processes.

**Arkansas Child Development and Early Learning Standards
Overview of Mathematical Thinking Domain**

MT1. NUMBER CONCEPTS AND OPERATIONS

MT1.1 Demonstrates number sense and an understanding of quantity

(Strands: Number names & Count Sequence, Comparison of Quantity, Connection of Number, Numeral & Quantity)

1. Number names
2. Counting in order
3. One-to-one correspondence
4. More or less
5. Cardinality (last # counted represents how many in group)
6. Subitizing (instantly recognizing without counting the number of objects in sets of one to four)
7. Recognizing written numerals
8. Writing numerals
9. Associating quantity with written numeral
10. Concept of zero

MT1.2 Explores combining and separating groups (numerical operations)

(Strands: Changes in Quantity, Addition & Subtraction, Early Division and Fractions)

1. Changes in quantity
2. Addition (combining groups)
3. Subtraction (separating or taking away)
4. Division (dividing objects into “fair share” groups)
5. Fractions (1/2, 1/3, 1/4)

MT2. ALGEBRAIC THINKING

MT2.1 Uses classification and patterning skills

(Strands: Classification & Patterning)

1. Sorting by attributes (color, size, shape)
2. Recognizing and replicating patterns
3. Creating patterns

MT3 MEASUREMENT AND COMPARISON

MT3.1 Participates in exploratory measurement activities and compares objects

(Strands: Measurement, Comparison, Seriation)

1. Measuring attributes of objects (length, height, weight)
2. Using comparative language while comparing (shortest, heaviest, first)
3. Seriation/ordering (smallest to largest)

MT4 GEOMETRY AND SPATIAL SENSE

Mt4.1 Explores and describes shapes and spatial relationships

(Strands: Shape Knowledge, Spatial Sense, Shape Manipulation)

1. Shapes (square, triangle, circle, rectangle, hexagon, trapezoid, cube, cone, cylinder, sphere)
2. Spatial directions (up, down, on, in, under, inside, beside, below)
3. Following directions related to directionality, order & position in space
4. Building designs using 2 & 3 dimensional shapes
5. Manipulating shapes to create designs

Teacher Note: *The numbered items that follow the strands are the related concepts and processes that the developers of CLAM feel are important to include as Standards are used to develop curriculum and access children.*