

Six Big Ideas: A Framework for a Developmental Mathematics Curriculum (Ages 3,4 and 5)

Research indicates that about 50 % of children's natural engagement with materials in a preschool classroom may be classified as 'mathematical' (Ginsburg, 2000). Opportunities for mathematical learning are plentiful. Daily experience in the block area, sand table, water table, dramatic play activity, cooking, table toy work, structured math manipulatives and puzzles all serve as tools to trigger mathematical engagement. It is however essential for the teacher to understand how to observe and classify the types of mathematics that a child is doing. A teacher must be able to name (articulate) the mathematics and develop comfort with communicating information about children's mathematical development to parents and to others. The following can serve as visual lens through which a pre school teacher may evaluate both a child's learning as well as his/or/ her classroom curriculum. Where are the strengths? What is missing? It is hoped that teachers will use this **guide** as a screen to examine the scope of the mathematics curriculum that they provide. It is also intended to prompt a teacher to add ideas to this list . It is by no means exhaustive. Remember, not every child will be operating at the same developmental level with regard to each of these big ideas. Teachers can use this framework to observe and stretch each child . Think about how the child is experiencing a piece of mathematics today and how you might connect that experience to a higher level of mathematical thinking for a child in days ahead. (e.g. "If a child is 'counting all' today when playing a dice game, when will he or she naturally start to 'count on'? And what might I provide to stir that possibility?) The following are six categories of mathematics that children need balanced experience with.

EARLY NUMBER

- matching one for one (e.g. Is there one napkin on the table in front of each chair at the snack table? One plate for each napkin? etc)
- more than/ less than through concrete collections and graphs
- rote counting in number songs/ finger plays
- the beginning of what is called 'rational counting' to 5 , later through to larger numbers
- matching pictures to objects (blocks shapes on block shelves) and later sets to sets (dominoes)
- initial experience with number and numerals to 10. Different functions of numerals (nominal, positional and cardinal meanings)
- develops ability to subitize (see and say numbers thru 5 , then 10 without counting)
- putting together and taking apart (adding and subtracting, relations between sets)

CLASSIFICATION AND CATEGORIZATION

- Recognizing self as member of different groups at the same time (I am a brother, a boy, a member of this class , a member of a family, member of a culture, race a neighborhood).
- sorting by putting all classroom materials in their appropriate centers and in boxes labeled as such.
- sorting natural objects at science table (leaves, shells, rocks)

SERIATION, PATTERNS , MAKING PREDICTIONS

- seeing self in relation to other members of the family (age, height, birth order)
- pattern of the days of a week (morning, afternoon night)
- at first noticing extremes in a graded collection and moving towards less obvious gradations (in between sizes...small smaller and smallest)
- stacking toys
- comparing qualities of texture (rough to smooth, hard to soft), also in sound, taste, weight.
- alert to the sequence in a recipe chart. (first we do this...then we do)
- recognizes the 'one more' pattern in the way the numbers grow
- begins to be able to process patterns by reading them, interpreting them and extending them (ABABABABA..., ABBABBABBABBABB...) Complicated patterns are less valuable for children at this age. Keep the number of elements to two or three only.

TEMPORAL CONCEPTS

- talking about yesterday , today and tomorrow (as before now or after now)
- developing a sense of time in relation to the events in a school day ("Just after lunch I get to play with the blocks , right?") Can use the photo hanging time-line of the day.
- sense of time before coming to school and after leaving school (wake up, dinner)
- initial symbols for time (morning, noon, afternoon, evening , night time)
- time as sequence (in big books read, stories, cooking. What comes next and next?)
- can follow sequence of turns in a game

SPATIAL RELATIONS

- use of puzzles , perceptual games, tangrams , Pratt unit blocks
- can find a place for self in meeting
- matches shapes to pattern boards . Generates own patterns and can reproduce them
- appropriately scales various block buildings to fit the accessories
- in painting - shows a sense of size relationships and proportion
- shows understandings of ideas about distance, direction and position (understands terms like behind, near , next to , on top of , underneath)
- can find geometric shapes in the environment...can select the different sized bowls needed for a recipe (larger, smaller , in between)

PRE- STANDARDIZED MEASURING

- shows interest in comparing sizes (direct comparison comes first " I am up to here on you" . "I am as tall as the door knob")
- can track plant growth (e.g. using a non standard measuring tool over time. Notices change.
- compares heavy things on a balance scale (understands what is happening when a scale is lower on one side than another) and can move toward making equivalence.
- use of variety of manipulative tools as non standard measuring units. (Do not impose standard measuring tools except in 'stories' or if child insists!)