Staff development outline
8/16/12

Foundations in Mathematics

The foundations represent goals to be reached by children as they turn four and five. They give teachers a general idea of what is typically expected of children at around 48 or 60 months of age.

They consist of behaviors in mathematics learning that are typical of children who will be ready to learn what is expected of them in kindergarten.

The foundations provide age appropriate competencies expected for older three-year-olds (48 months) and older four-year-olds (60 months).

Premise: children's learning takes place in everyday environments; this means through age appropriate activities, play, interactions and relationships. The observation of the children's competencies needs to be performed in a regular classroom during a typical day and activities.

Five strands in mathematics are covered in the foundations:

1. **Number sense** (children's initial understanding of quantity without actually counting the objects, counting skills and understanding of quantities (more, fewer, less, part-whole relationships).

2. **Algebra and Functions** (Classification and Patterning). These include sorting, grouping, and categorizing objects based on a certain criteria. Children analyze, compare and classify objects by some attribute (e.g., color, shape). This is something that children do not do on their own but the teacher needs to facilitate. Patterning requires identifying a pattern, repeating it and predicting what comes next. This requires teacher facilitation and modeling as well.

3. **Measurement** (comparing and ordering objects by length, weight, or capacity).

4. **Geometry** (properties of objects such as shape, size, position and the relation of objects in space). Children identify shapes at first but then they can make shapes using different shapes. They can describe the direction, distance, and location of objects in space.

5. **Mathematical reasoning** (Solving problems such as, how many napkins? How will the shape fit in a hole?)

Guiding principles when facilitating acquisition of mathematics:

- Build on children' s natural interest in mathematics and their intuitive and informal mathematical knowledge;
- Encourage inquiry and exploration to foster problem solving and mathematical reasoning;
- Use everyday activities as natural vehicles for developing preschool children's mathematical knowledge;
- Introduce mathematical concepts through intentionally planned experiences;
- Provide a mathematically rich environment;
- Provide an environment rich in language, and introduce preschool children to the language of mathematics;
- Support English learners in developing mathematical knowledge as they concurrently acquire English;
- Observe preschool children and listen to them;
- Recognize and support the individual differences;
- Establish a partnership with parents and other caregivers in supporting children's learning of mathematics.

Environment and Materials

- Enrich the environment with objects and materials that promote mathematical growth;
- Integrate math-related materials into all interest centers in the classroom;
- Provide real-life setting in the preschool environment;
- Use materials and objects that are relevant and meaningful to the children in your group;
- Use children's books to explore mathematics with children;
- Be intentional and mindful in setting up and using the physical environment.

How to support children in the following:

Number sense

- Provide lots of objects to count;
- Start with small sets of objects;
- Start with objects arranged linearly;
- Model counting;
- Encourage children to self-correct their counts;
- Consider adaptations for children with special needs;
- Make number-related games, books, and other materials;
- Play group activities focused on counting;
- Encourage recognizing and naming written numerals;
- Expose preschool children to quantities represented in different forms ### !!!!
- Promote use of subitizing skill;
- Promote the use of comparison terms (more, same as, fewer, less);
- Use everyday interactions and routines and literature, songs, and games to illustrate and discuss addition and subtraction transformations;
- Make estimations;
- Use graphing with children.

Algebra and Functions

- Organize the classroom into different categorized storage areas to facilitate classification;
- Include materials and objects for sorting in the environment;
- Identify opportunities for sorting and classifying in everyday routines;
- Recognize sorting in play;
- Engage children in conversations about sorting and classifying: ask questions, help children label the groups and verbalize criteria for sorting and have them come up with their own criteria;
- Integrate sorting into children's current topic of study;
- Point out patterns in environment;
- Say pattern aloud;
- Help children describe patters using descriptive words;
- Plan patterns for different levels;
- Play with patterns in various formats (pictorial designs, movement, sounds, rhymes and stories).

Measurement

- Comparing (children develop understanding of attributes-weight, size, volume by looking, touching and comparing);
- Ordering (ordering by size);
- Measuring;
- Provide opportunities for all of the above;

- Build the vocabulary (taller, longer, lighter);
- Ask questions;
- Encourage them to use measurement to solve problems;
- Provide opportunities to compare and order objects;
- Use literature to illustrate measurement concepts;
- Provide small group activities where you will use standard and non-standard measurement;
- Encourage them to estimate measurement;
- Encourage to record what they have measured.

Geometry

Shapes:

- Name shapes;
- Use them in everyday situations;
- Observe and compare shapes;
- Discuss their attributes;
- Manipulate shapes;
- Compose and decompose shapes from other shapes;
- Use books, games and other materials;
- Play with blocks;
- Have them explore different types of shapes;
- Match, sort, and classify shapes.

Position in space:

- Provide materials and equipment to promote spatial sense;
- Support spatial sense with everyday interactions;
- Use spatial words and point out spatial relationships;
- Expand children's words (position, direction, distance);
- Include songs, games, literature, construction opportunities.

Mathematical reasoning

- Identify and create opportunities for mathematical reasoning;
- Ask meaningful questions that promote mathematical reasoning.