Science in the Integrated Curriculum for Young Children: Hands-On*

(Notes based on a presentation by Professor Bonnie Epstein, Hofstra University, Andrea Shea and Lee Mellado, Hewlett Public Schools)

Picture the huge Plaza Room in the Hofstra University Student Center filled with tables, each of which was filled with a different, attractive display of materials, posters, books, and questions to explore. Picture the walls decorated with related charts, instructions, recipes, and samples of young children's work. Picture a dynamic, team of professionals from Hofstra University and the Hewlett Public Schools who helped participants focus on a number of important issues that connected the inviting and engaging experiences at each table to state learning standards.

The presenters provided the following Web site: http://www.nysed.gov This Web site offers access to the Office of Elementary, Middle, Secondary and Continuing Education. Each learning standard on the Web site that addresses mathematics, science, and technology provides key ideas about what students need to know, performance indicators of what students should be able to do to provide evidence that they understand the key idea, curriculum to plan and assess instruction; understandings that provide specific detail about the concepts underlying each performance indicator, and ways to translate the curriculum into instruction, with specific ideas for projects.

With the New York state learning standards as their context, the presenters shared some of the ways in which they interpreted the "Activities that Integrate Math and Science" (A I M S Foundation, http://www.aimsf.org/) and other activity programs. Web sites that they recommended appear at the end of these notes.

Some of the presenters' general recommendations include:

• Use everyday materials to study the essential questions that the state standards suggest.
• Integrate manipulative materials to the physical and life sciences, process learning skills, and children's literature.
• Provide a variety of ways for children to represent their findings, e.g., drawing, graphing, and writing.
• Use nonstandard measures before standard measures.
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Ice Cream

The key question was, "How does the ice cream mixture change?" Highlights of other activities were making ice cream by using two plastic ziplock bags. The inner bag contained ingredients, and the outer bag contained ice and salt. Vigorous shaking followed: the change from liquid to solid was the point of the activity, as well as tasting the product. Recipe: 2 cups sugar, 1 cup evaporated milk, 2 teaspoons vanilla, 1 package instant vanilla pudding, and 8 cups of milk. Clearly, after the ingredients are mixed together, the liquid can be divided into many small bags. Many small bags can be shaken inside a large bag, or only 2 bags can be used. If 2 small bags are used, place 1/3 cup of the liquid in the smaller bag and seal it, place _ cup of salt and _ bag of ice into the larger of the small bag and seal it; and then turn it over and over until ready (10-15 minutes). In addition to a word and picture recipe, the presenters recommended a book by Mary Eliboflt Reid, Let's Find Out About Ice Cream. Imagine the kind of discussion that might follow when the children see the book after they have tasted their own ice cream. Before the activity, children might make some predictions that the teacher and children record on a chart. After the activity, the children and teacher record their findings.

Other Activities

Some of the other activities explored such topics as floating: blowing objects, measuring with a variety of nonstandard and standard tools; tracing shadows that the sun makes around a three-dimensional groundhog figure; making a "rainwater tea" (that explored evaporation and condensation); and measuring and planting both raw and roasted sunflower seeds to compare findings. Use of the presenters' provided extensive, detailed handouts.

It was clear to the enthusiastic participants who visited many tables that they wanted even more time to learn about all the displays.

From the Editor:

This newsletter reports some of the newsletter reports some of the proceedings of the February 2005 Early Childhood Educators Conference focusing on science. This year's 2005 conference participants became engaged in a variety of activities that were both enjoyable and challenging. Next year's theme, focusing on literacy learning, grew out of participants' suggestions. Teachers and administrators in schools that serve young children expressed great concern that some policy makers expect younger and younger children to be responsible for narrowly defined tests of isolated "R" skills. The literacy focus of the 2006 conference broadens the vision of literacy learning to include the continuing pursuit of meaning along with skills.

The February 2006 Early Childhood Educators Conference focusing on literacy learning deals with current issues raised by conference participants.

One of the commitments of Hofstra's Early Childhood Educators Conferences is to provide support for inquiry-based, relevant early education. Another commitment is to share some ways to teach that reflect the conditions by which young children learn. Our next conference will offer workshops that model ways to work with young children that are engaging, meaningful, intellectually satisfying, and supportive of learning and teaching. In keeping with the suggestions of participants, the format will include in-depth, participatory, hands-on workshops rather than lectures.

Doris Fromberg, Ed.D.
**W** live in an age in which children have many tests. Teachers must be aware that children who do well on tests come from problem-solving environments.

Teaching is a continual process of solving pedagogical problems. Teaching includes the asking of important questions, which have answers that have meaning to the learners.

**STABILITY AND CHANGE**

The state Mathematics, Science and Technology Standard 6, dealing with stability and change, is not something that we teach directly. Learners achieve an understanding of change and stability in the natural course of using materials with questions in mind. For example, for this workshop, the tables were set with different materials to explore and questions to help focus the exploration. On one table, there was the question, “How Can I Make It Change?” On the other was also a simulated city that children had made. By creating a “snowstorm” with sifted flour, it was possible to consider the changes within the simulated city. Different groups of participants considered the different ways in which a snowstorm changes the environment. Some of the questions raised included the following:

- When you go into your classrooms after a snowstorm, what might you do?
- Does snow really go in a window if it’s open? (depends on the wind)
- How do things change if there is a snowstorm?
- How might you test out some of the things you discussed?
- What happens if the snow evaporates?
- What can we see from one side but not from another as we look at the simulated city? (skips up differently?)
- If we pour more snow on this side, what is happening?
- What are the different properties when we compare snow and water?

Scientists study how snow falls and piles. Consider the angles on snow plows to accommodate snow removal. We need to look very closely and always try to set the stage for important conversations.

Consider how block play and silting can influence science learning. You can still use a model. Parents may see this kind of activity as play rather than serious work.

**MEASUREMENT**

Another state standard focuses on measurement. We can measure things with different scales. The opportunity to measure is one way to explain scientific events. It is important to look at and articulate the transformations that take place. Some activities in which the participants engaged included the following:

**ROCK SALT**

What can I do to this rock salt to create clean plain salt?

**GLUE**

How can I change this paper (including napkins, paper towels, a balance scale, and water), is there any way to sort them out again? Children can see many patterns.

There was a palpable enthusiasm of participants as they pursued their answers and then shared their findings. The glue group considered the Little Miss Muppet nursery rhyme that includes “curds and whey.” A question to consider is How much was each (curds and whey)? So, we need to keep track of the amounts we used. Keeping track makes it possible to compare different results. You made your paper chains. Now you need to prove that your glue is waterproof.

**COLOR SEPARATION**

Separation is the hallmark of chemistry. After mixing colors together (using magic markers, paint, etc., and water), is there any way to sort them out again? Children can see many patterns.

It is a given that teachers need materials. She presented an apparently empty bottle with an attached balloon, with the advice to use only to a round balloon. Bubbles were the same color; the same thing happened.

It is important for teachers to help children keep track of emerging questions. Never give people things that they did not ask for. Participants described what they had done. Invite learners to describe what they have been doing. This helps to clarify learning questions. Can children make an entrance? It is important to describe the processes that the participants used. It must be on paper. How can you make an easier way to relate books after children have had experiences with materials.

There are some helpful principles that emerged from this session:

- It is important for teachers to help children keep track of emerging questions.
- Never give people things that they did not ask for.
- Participants described what they had done.
- Invite learners to describe what they have been doing.
- Keep track of the amounts we used.
- Keeping track makes it possible to compare different results.
- You made your paper chains.
- Now you need to prove that your glue is waterproof.

Here are some helpful principles that emerged from this session:

**BERNOULLI’S PRINCIPLE**

Materials: straw, ping pong ball, cup. This activity demonstrates Bernoulli’s Principle by asking children to blow into a straw. The child blows into the straw, trying to keep the ball in the air. With the force of a breath, the ping pong ball remains in the air and will not drop. In reverse, as the child blows down over the ball, the ball does not fall down to the ground. Instead, it has a vacuum cleaner effect and stays “stuck” in the cup.

**REACTION TIME**

“—The Hand Squeeze.” Children form a circle around the room, holding hands. The teacher or student leader holds a stop watch and times how long it takes for a starting point in the circle to squeeze the hand of the next; the next, etc., until all hands have been squeezed and the person who started the chain reaction calls “Stop.” At this point the teacher or student leader times the time it took. This continues for three or four test runs. The reaction time gets faster and earlier until it comes to a constant at around 6-8 seconds.

**HEGG SAFETY**

**Egg package contest.** This important design activity provides children with a chance to create a safety package to prevent a raw egg from breaking when the package falls from a point high in the room or hallway. Children have a chance to share ideas and try out different materials, using discarded cardboard milk containers, newspapers, and other materials. They have a chance to plan, record, and compare the findings from different design plans.

Some learning principles include the following:

**THE TEACHER’S ROLE IS TO BE A MENTOR.**

Teachers enable children to self-learn, to help children see that they are able to explore learning on their own in their everyday life activities.