

Office of Head Start
Early Childhood Science
National Webcast Series
Discovering Science



Webcast #3: Language and Literacy through Science



Science Webcast #3 Script – Final



Slide 1:

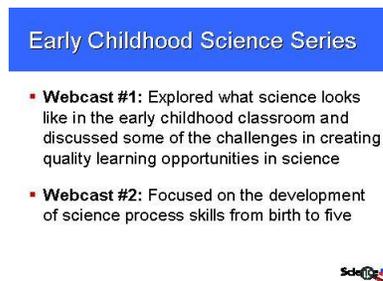
JEAN SIMPSON: Welcome to Discovering Science. This is episode three of our four-part series on building the foundation for science in the early years.

UP CG:

Jean Simpson, Ph.D.

Education Specialist, Office of Head Start

My name is Jean Simpson. I am an Education Specialist in the Division of Educational Development and Partnerships at the Office of Head Start. Thank you for joining us today.



Slide 2:

During the first Webcast, we explored what science looks like in the early childhood classroom... and we discussed some of the challenges in creating quality learning opportunities. In the second Webcast, we focused on the development of science process skills from birth to five.

Early Childhood Science Series

- **Webcast #3:** Reveal ways for teachers and parents to integrate science across early childhood learning experiences and environments with an emphasis on young children's language and literacy

Slide 3:



During today's Webcast, we will reveal ways for teachers and parents to integrate science across early childhood learning experiences and environments...with an emphasis on young children's language and literacy.

Our experts for this Webcast are Dr. Shari Ellis and Barbara Dowling. Shari is the Senior Early Childhood Science Advisor for the Office of Head Start and she is also Project Director of the Center for Informal Science Education at the Florida Museum of Natural History. Barbara is a Head Start teacher in South Dakota and a 2008-2009 National Head Start Fellow in the Office of Head Start.

Shari...

UP CG:

Shari Ellis, Ph.D.

Senior Advisor, Early Childhood Science, Office of Head Start

SHARI ELLIS: Thank you, Jean. It's great to be back with all of you. You can download a copy of the Learner's Guide for this Webcast by clicking "Learner's Guide" located on the lower portion of your screen. After each Webcast, we will provide a list of resources for further study. We will also e-mail a feedback form, inviting your comments on this Webcast and your suggestions for future Webcasts.



Slide 4:

If you want to watch these Webcasts again, or you want to refer a friend or colleague, this series is also available on the Web through the Early Childhood Learning and Knowledge Center, also known as the E-C-L-K-C.

Barbara...

UP CG:
Barbara Dowling
2008-2009 National Head Start Fellow, Office of Head Start

BARBARA DOWLING: Thank you, Shari. Let me start by thanking all of you for the thoughtful questions and comments you shared about the first two Webcasts. Here's one e-mail from Neal Bickman, an Education Specialist in Levy County, Florida.

Viewer E-mail

"For many years I wondered how to incorporate science in the classroom, as I thought it was an area that was weak in every classroom I monitored including my own Child Care setting. Little did I know that scientific thinking was happening in my interactions with children by the open-ended questions asked and enabling children to discover the things in their environment whether inside or out of the classroom.



Slides 5:

Viewer E-mail (continued)

Science does not have to be some things in one small corner of the room. It is all over our room when we allow for discovery and exploration.

Open ended questions need to be asked as children explore with their senses, observing, classifying, investigating and making predictions. Teachers need to give children the chance to explore on their own and make mistakes and learn from them without us doing it for them.



Slides 6:

Viewer E-mail (continued)

Science is all around us – the food we eat, how things work, the wonder of nature, the information that we get from our investigations, how things are classified and categorized. Once children are given the opportunity by our teachers creatively changing the classroom environment, they will be better equipped to do higher order thinking, reasoning, and communicating.



Slides 7:

Viewer E-mail (continued)

*Looking forward to more ideas and knowledge of science in our classrooms through these webcasts.**

*-Neal R. Bickman
Educational Specialist
Childhood Development Services
Levy County, Florida*



Slides 8:

Neal, thanks for sharing your insight. Your e-mail nicely summarizes science in the early childhood classroom. In this Webcast, we are going to further explore how science can foster the development of process skills and dispositions, and promote language and literacy, as well as learning across domains.

Shari...

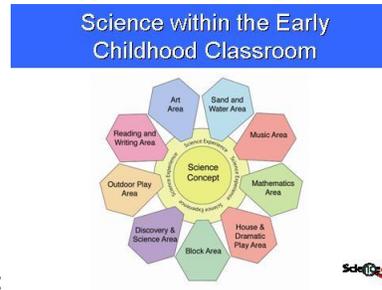
UP CG:

Shari Ellis, Ph.D.

Senior Advisor, Early Childhood Science, Office of Head Start

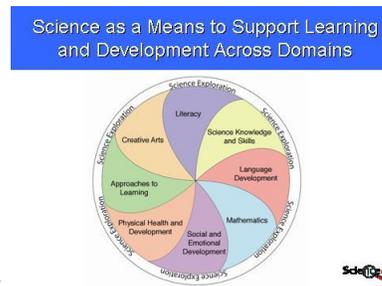
SHARI ELLIS: As we discuss how science can support development across domains, it is important to describe how this can happen. One approach—perhaps the one you are most familiar with—is to select a science idea or topic and follow it in different interest areas or centers. Programs that use themes such as “family,” “community helpers,” or “harvest time” to organize daily activities already use a version of this approach.

Teachers also can begin with a science idea or question and then expand exploration throughout the classroom.



Slide 9:

By definition, quality science explorations are going to involve language, literacy, social-emotional skills, and approaches to learning. Depending on the experience, mathematics, motor development, and creative skills may also come into play.



Slide 10:

Therefore, it is not necessary to formally integrate science across instructional areas in order to intentionally support children's developing skills. This is one of the most exciting and powerful aspects of science in the early childhood classroom!

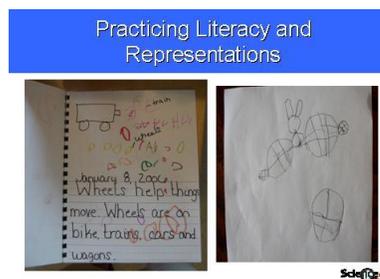
Rather than having an idea, concept, or theme reflected throughout the classroom, the teacher uses science as the method to support the development of a wide range of skills, knowledge, understandings, and attitudes.

Let's work through an example with a science idea... how about wheels and how they work?

During an exploration of wheels, the teacher supports children's language development by asking questions that elicit answers of more than one or two words such as: How do wheels help us? What would happen if a car did not have any wheels? What if it had 2 wheels? Tell me about the biggest wheel you have ever seen?

As part of the process, the teacher would introduce new vocabulary—words such as wheel, axle, tread, and spoke. The teacher could also easily incorporate mathematics. It would also be natural to talk about how many wheels different kinds of vehicles require.

Throughout this large or small group interaction, children can practice important social-emotional skills such as waiting their turn to speak, sharing, and engaging in peer conversation.



Slide 11:

As part of the investigation, children could draw a wheel or discuss wheels in their journals—thereby practicing literacy and representational skills.



Slide 12:

And children's curiosity and interest in learning more about wheels can lead them to a book. These examples make the point that science explorations offer many opportunities to foster learning and development across domains.

Now, this way of thinking about science and the approach in which science is integrated across the classroom are not mutually exclusive. One can incorporate multiple domains of development into a science exploration and then fully integrate the science ideas or topics throughout the curriculum. It is important to distinguish these approaches though for two reasons.

One, it highlights the rich opportunities afforded in any science exploration. It is those opportunities that are the focus of our Webcast today. Two, not every science idea can be easily integrated throughout the curriculum. But that doesn't necessarily mean that the idea is not worthy of science exploration.

UP CG:

Barbara Dowling

2008-2009 National Head Start Fellow, Office of Head Start

BARBARA DOWLING: With these approaches in mind, how do teachers, decide what phenomena to study? We accomplish this through careful observation of the children, by examining the environment of our classrooms and what it affords as areas of study, by observing the changes in nature outside, and the happenings in our communities.

Let's look at 3 examples.

How does frost form on the sidewalk?



Slide 13

Slide 13:

While on a walk the children asked, “How does frost form on the sidewalk?”

Why can't babies walk?



Slide 14:

When Mayna's baby sister came to class the children asked, "Why can't babies walk?"

How can I get the paper to stick together?



Slide 15:

While creating in the art area, Leah wondered, "How can I get the paper to stick together?"

Each of these areas offers a myriad of events, phenomena, and experiences that can become rich projects or areas of scientific study.

UP CG:

Shari Ellis, Ph.D.

Senior Advisor, Early Childhood Science, Office of Head Start

SHARI ELLIS: Now let's explore in more detail how science experiences can foster development across all domains. To begin, we're going to watch a short video clip of a teacher

and small group of children creating a new substance—“clean mud.” As you view the video, please make note of the ways this single experience involves multiple domains of development.

Roll Tape!

Clean Mud

Incue: “Now we’re going to mix the soap…”

TRT: 1:45

How many domains did you observe?



Domains of Development

- Literacy skills: receptive and expressive language skills, conversational rules, and use of new words
- Mathematical skills and understandings

Slide 16:

Slide 16

Clearly this science experience included literacy skills. Children used both receptive and expressive language skills, practiced conversational rules, and heard a few new words such as recipe, grater, and gradually. The experience also involved several kinds of mathematical skills and understandings. The steps in the creation of “clean mud” were represented by numbers in the recipe book, the steps were followed in a sequence, and the recipe called for two measured cups of water.

Domains of Development

- Motor skills
- Social skills: taking turns, waiting, sharing space and materials

Slide 17:



Creating “clean mud” also involved motor skills.

The experience was also demanding of children’s social skills. They needed to take turns using some of the materials. Some steps—such as measuring—could only be performed by one or two children and the others needed to simply wait. When all hands were in the mixing bowl, the children needed to make room for their classmates and not get too upset when someone got too close.

And, of course, there is the science! What science ideas were addressed in this experience? I hope you saw several. One was surely that it is possible to create a new substance by mixing others together.

UP CG:

Barbara Dowling

2008-2009 National Head Start Fellow, Office of Head Start

BARBARA DOWLING: The potential of science explorations for fostering growth in skills and understandings across domains of science has been noticed by a growing number of teachers and researchers. One such team is Kathy Conezio and Lucia French at the University of Rochester.

This team developed a science-centered intervention designed to foster children’s language and literacy skills. Let’s listen to Lucia and Kathy talk about their work with teachers.

Roll Tape!

Lucia and Kathy

Incue: “Once we started focusing…”

Outcue: “...content for literacy activities.”

TRT: 5:36

BARBARA DOWLING: Clearly, science explorations abound with opportunities to learn new vocabulary that lay the foundation for reading. One thing I find so exciting about engaging in science in my classroom is that all of the elements that research has shown to foster language development are a natural part of the experiences. Let’s briefly review some of this research, especially the work of Betty Hart and Todd Risley—authors of a book titled “Meaningful Differences in the Everyday Experience of Young American Children.”

Hart & Risley Research on Children's Vocabulary

- Between the ages of 18 months and 6 years, children learn an average of around 9 words per day
- By age 6, children's vocabulary may include **14,000** words
- Children learn most of their words through conversations with other people, especially adults

Slide 18

Slide 18:

Scientists estimate that between the ages of 18 months and 6 years, children learn an average of about 9 words per day. By age 6, children’s vocabulary may include 14,000 words. How is this possible?

Research shows that—while some words need to be directly taught—young children learn most of their words through conversations with other people, especially adults.

The importance of conversations for children’s vocabulary development was clearly demonstrated in the Hart and Risley study which followed children from diverse families for over two years during the time children were learning to talk. Each month, beginning when the children were 7 months of age, observers visited homes and recorded the spoken interactions between children and parents.

Hart & Risley Research on
Children's Vocabulary (continued)

- The average American toddler hears around 1,500 words per hour
- There are large differences in the quality of language environments of young children
- Children in poverty heard an average of **only 600** words per hour
- Families with professional parents heard **upwards of 2,000** words per hour

Slide 19:



What did they discover? That the average American toddler hears around 1,500 words per hour and there are very large differences in the quality of language environments of young children. The children in this sample that were living in poverty heard an average of only 600 words per hour, while those in families with professional parents heard more than 2,000. If you sum these numbers over the first three years of life, the difference in the number of words heard by children in different environments is staggering.

Hart & Risley Research on
Children's Vocabulary (continued)

- A child in a low income household is likely to hear a **total of 10 million words**
- Children in professional families hear **33 million words**

Slide 20:



A child in a low income household is likely to hear a total of 10 million words...which seems like a lot. But children in professional families would have heard 33 million words.

Hart & Risley Research on
Children's Vocabulary (continued)

- Children with more talkative parents have larger vocabularies than children with parents who talk with them less often
- By **age 3**, children reared in poverty knew an **average of 500 words**
- The average vocabulary of children of professional parents **exceeded 1,000 words**

Slide 21:



This study also reported that children with more talkative parents have larger vocabularies than children with parents who talk with them less often. By age 3, the children reared in poverty knew an average of 500 words, while the average vocabulary of children of professional parents exceeded 1,000 words.

UP CG:

Shari Ellis, Ph.D.

Senior Advisor, Early Childhood Science, Office of Head Start

SHARI ELLIS: You may be thinking, what does this have to do with science? Let me explain.

One of the issues that Hart and Risley wondered about was whether parents who did not talk with their children and those who did, talked about the same things or different things.

Hart & Risley Research "Business Talk"

- Includes directives, negatives, and prohibitions:
 - "Stop that"
 - "Put that down"
 - "Hold still"
 - "Give me your hand"

Slide 22:



What the scientists discovered is that all the parents in this study used similar amounts of what is called "business talk," or what some refer to as "regulatory talk". This kind of talk includes directives, negatives, and prohibitions— things such as "stop that;" "put that down;" "hold still," or "give me your hand." This talk is low in cognitive demands on the child.

More talkative parents engaged in conversational talk, or chit-chat, about things other than "business talk." Also worth noting is that this "extra" conversation was designed to keep toddlers engaged. And, if you think about this for a moment, it makes sense. Toddlers—or even older children—simply allowed to wander will most likely hear a lot of talk designed to keep them from hurting themselves, other people, or things... or punitive talk after the fact.

To engage children requires a completely different kind of talk. In this study, quality talk was shown to involve lots of words, complex ideas, subtle guidance, and positive reinforcement. In contrast to directives and the like, this kind of talk is high in cognitive demands.

Observations of parents talking with young children in their homes and community settings, such as museums, reveal that science experiences are natural contexts for extended quality

conversations. Research shows that these early conversations not only teach children important conversational skills, but also concepts. Let's listen to a description of some research findings from Dr. Jennifer Jipson.

Roll Tape!

Jennifer Jipson Video

Incue: "Children's experiences with science..."

Outcue: "...discuss complex phenomena."

TRT: 5:21

UP CG:

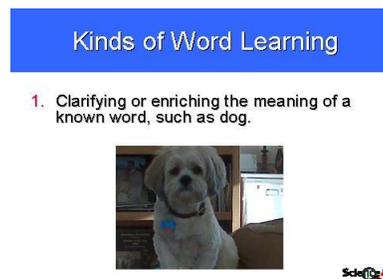
Barbara Dowling

2008-2009 National Head Start Fellow, Office of Head Start

BARBARA DOWLING: Dr. Jipson's point about discourse being more important than accuracy is very interesting. In some ways, it parallels a point we made in our first Webcast—that it is more important to foster a child's wonder and curiosity than worry about science facts. That said, of course, in Head Start we want both accuracy and meaningful discourse.

Science conversations frequently involve the use of new and complex words. Research has shown that the sophistication of children's early vocabulary is linked to both later vocabulary and reading comprehension. Unfortunately, adults sometimes avoid using new or difficult words with young children. Given the proven benefits of a sophisticated vocabulary, what can adults do to help children learn new and complex words?

We know that children learn most words in conversation. A child will learn a word more easily if they hear it used often, and in many contexts. Sometimes, however, it is helpful to explicitly teach vocabulary. To help us think about the situations in which it is helpful to define a word, let's review the four different kinds of word learning that occur. We can readily see examples of each kind of learning in science.



Slide 23:

The first kind of word learning involves clarifying or enriching the meaning of a known word. For example, when children are first learning labels, they often over-extend use of a word. So, a child might use the word “dog” to refer to any small furry animal with four legs. Sometimes, however, a child’s definition of a word is too narrow. There are children, for example, who think “dog” refers only to their dog, Fluffy.

Most children have an overly narrow definition of the word “plant.” For example, they may limit their use of the label “plant” to plants that are in pots, or to plants that are about 12 inches tall—not grass, not trees. Let’s watch how one teacher expanded children’s definition of plants.

Roll Tape!
Plant Map Video
TRT: 1:10

Children gradually fine-tune word meanings as their understanding of the world grows.

Kinds of Word Learning

2. Learning new meanings for known words

Examples:

- gas for the car or gas vapor
- scales that weigh people or scales on fish

Slide 24:



A second type of word learning involves learning a different meaning for a known word.

Children may be familiar with the gas that we put in our cars or the scale that they stand on at the doctors' office. These meanings may need to be directly addressed when teaching that gas is a state of matter, or that scales are a protective body covering.

Kinds of Word Learning

3. Learning a new word representing a known concept

Example:
soil is another
word for *dirt*



Slide 25:

The third kind of word learning involves learning a new word for a concept—be it an object, action, category, or whatever else. This kind of word learning is rich with opportunities to expose children to juicy words! Children are usually quite familiar with dirt, but can use the word soil with equal ease if given the opportunity. Science also provides many opportunities to learn descriptive words that are just fun to say... slippery, for example.

Kinds of Word Learning

4. Learning the meaning of a new word for an unfamiliar concept

Examples:

- metamorphosis
- dissolve
- friction

Slide 26:



The fourth kind of word learning is the most difficult. This is learning a new word associated with an unfamiliar concept. One reason that these words are difficult to learn is that the concepts they represent may themselves be difficult to grasp. And children’s understanding of the concepts may be limited. Take metamorphosis for example. This process in which the body of an animal such as a frog or butterfly is so completely transformed is almost unbelievable. Most of us probably do not understand it very well. But, we can use the word “metamorphosis” and so can young children.

Learning juicy, grown-up, sophisticated words can jump start a cycle of positive learning. In addition to helping with later reading—especially comprehension—children’s use of juicy words impresses parents and leads to higher expectations for their children. Dr. Patton Tabors, an expert on language development, explains...

Roll Tape!

Patton Tabors One

Incue: “During science conversations, what do children learn...”

Outcue: “...what those words mean.”

TRT: 4:30

Let's listen to Dr. Tabors' expand her suggestions for engaging young dual language learners.

Roll Tape!

Patton Tabors Two

Incue: "Well I think having..."

Outcue: "...hearing actually mean."

TRT: 2:11

UP CG:

Shari Ellis, Ph.D.

Senior Advisor, Early Childhood Science, Office of Head Start

SHARI ELLIS: Children also learn word meanings from listening to others read to them.

Researchers have identified two strategies that are especially helpful in teaching children new words through shared book reading. One strategy is to provide synonyms or definitions when you encounter words that are unfamiliar to the child.

A second strategy is to ask children questions that repeat new words, or require children to repeat the new word in their answers. In this next video clip, we see a teacher introducing new terms for familiar seeds, and then reinforcing their use later in the context of an exploration.

Roll Tape!

Seeds Video

Incue: "Can you tell me where..."

Outcue: "...that are meaningful."

TRT: 3:12

SHARI ELLIS: Experts point out that we often miss opportunities to foster new vocabulary growth when reading with young children by asking too many questions, or only questions that can be answered with yes or no, one word, or no words at all.

That said, it is important to adjust the level of questioning to children's knowledge level. It is often a good idea to begin with low demand questions. These questions allow children to feel successful. Low demand questions keep children engaged and motivate them to try to answer more challenging questions.

Of course, books do much more than teach vocabulary. Books involve children in the world of representations, inspire the imagination, convey factual knowledge, help make concepts concrete, and foster curiosity and a desire to learn more. I recently spoke with Dr. Linda Lamme about the importance of quality science books for children's science learning.

Roll Tape!

Linda Lamme

Incue: "I think the reason we need books..."

Outcue: "...the best books to use."

TRT: 1:59

Dr. Lamme highlighted several criteria for choosing science books for young children.

Characteristics of Good Science
Books for Young Children

- Accurate science
- Attractive
- Clear pictures
- Interactive/Enticing
- Highlights science process skills

Slide 27:



She emphasized, very strongly, the importance of the accuracy of the science—in terms of both the text and the illustrations. And, she warned against using books that have animals with human characteristics. Off camera, Dr. Lamme explained to me that she believes nonfiction books are better suited to science than fiction books.

Teacher Stacy Thomas began her seed experience with a nonfiction reference book. But she said she strongly endorses using both fiction and nonfiction books in early childhood science.

Barbara, let's talk briefly about the issues involved in using both nonfiction and fiction books to support science in early childhood classrooms. What are some of the advantages of using nonfiction books?

UP CG:

Barbara Dowling

2008-2009 National Head Start Fellow, Office of Head Start

Use of Nonfiction Books

- As a source of background knowledge
- As a source of new vocabulary
- To create accurate links between what is in the books and what is observed

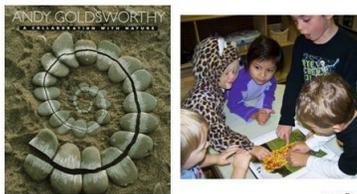
Slide 28:



BARBARA DOWLING: Nonfiction books are a great source of background knowledge for the children and the teachers. They are also a great source of new vocabulary. Nonfiction books also create links between what is in the books and what is observed in nature. Some of the best nonfiction books to use are those with photographs, especially photographs that show things close up or magnified. For example, it may be difficult or perhaps unsafe for children to get a really good look at a live bee, but they can see a bee in a close up photograph.

Big Books with amazing photographs are clearly designed for young children.

Wonderment & Conversations



Slide 29:



Other books, even some for adults, contain beautiful photographs that can stimulate wonderment and conversations. One I use is by Andy Goldsworthy, *A Collaboration with Nature*.

UP CG:

Shari Ellis, Ph.D.

Senior Advisor, Early Childhood Science, Office of Head Start

SHARI ELLIS: Two features I like in nonfiction books are high quality, realistic illustrations and books that read two ways: a single version and one with more details included.

Realistic Illustrations



Slide 30:

Slide 30

For example, there is a series of books by Cathryn and John Sills with titles such as “About Reptiles” and “About Birds.” These books have beautiful illustrations and minimal text, but more detailed information is available in the back of the book for those who are interested. I think that is helpful when children start asking questions.

BARBARA DOWLING: Another series of nonfiction books that the children in my classroom enjoy is the First Discovery books.

First Discovery Books



Slide 31:

These contain overlays that allow the children to see “inside” objects, or changes that take place over time with objects and the environment. Can you imagine how surprised children are when they can see the chicken in the egg... or what lives inside the shell?

SHARI ELLIS: What do you think about using fiction books to support science?

BARBARA DOWLING: I think fiction does have a place. The children often find the stories engaging and you can point out real world relevance, such as... remember when we did...? Or, have any of you ever...?

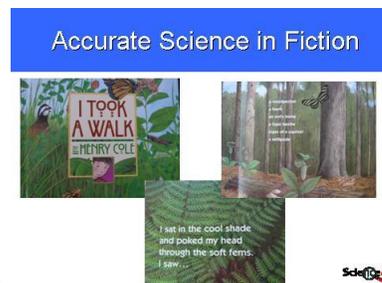
Accurate Science in Fiction



Slide 32:

One of my favorite fiction authors is Lois Ehlert who has written wonderful books such as Leafman, Nuts to You, Planting a Rainbow, and Growing Vegetable Soup. Ehlert often incorporates facts and information about the topics at the end of the book.

SHARI ELLIS: There are books that are technically fiction, but they are very much based in the real world.



Slide 33:

Some of my favorites are by Henry Cole. The illustrations really invite close observation and study. When we select books in our work at the museum, we are primarily concerned with accuracy and avoiding misconceptions—whether the book is fiction or nonfiction. So, we avoid books that have dinosaurs and people interacting, because dinosaurs and people never co-existed. We also review books carefully to see that they classify animals correctly. You would be surprised by the number of books supposedly about insects that also talk about spiders and worms—neither of which are insects.

Let's return to Dr. Lamme's point about animals with human characteristics. This is pervasive in children's literature and is hard to avoid—you need to carefully evaluate each book. One book

we use in our project that does include animals that talk is an out of print title called “Mr. Archimedes Bath.”

We elect to use this book because the science content is so strong. The strength of the science content in this book outweighs its portrayal of animals.

Roll Tape!

Mr. Archimedes Bath

Incue: “Mr. Archimedes bath always...”

Outcue: “...okay let’s try it.”

TRT: 2:52

SHARI ELLIS: It is interesting that both of the science explorations we viewed today began with a book. Some early childhood experts argue that science investigations should begin with children’s direct experiences, not with a book.

Barbara, I am interested in your perspective on this. How do you think books should be used to support science?

UP CG:

Barbara Dowling

2008-2009 National Head Start Fellow, Office of Head Start

BARBARA DOWLING: Books can be used to spark children’s interests or to provide further information about a topic they have begun to investigate. If you choose to introduce a scientific concept through literature, you will need to engage in careful observation of the children to make sure the children are interested in the topic and that there is potential for further exploration and study.

UP CG:

Shari Ellis, Ph.D.

Senior Advisor, Early Childhood Science, Office of Head Start

SHARI ELLIS: Thank you, Barbara. I’d like to return to another point made by Dr. Lamme—the importance of quality pictures in books because pictures are one form of representation of the real world.

Importance of
Quality Pictures in Books

- Helpful for younger children
- Teach new words via picture books
- Help children distinguish between cartoon-like pictures and real objects

Slide 34:



Quality pictures are especially helpful for younger children. Research shows that young children can readily learn new words via picture books, but in order to connect the picture to the real world, the pictures need to be realistic. Children have difficulty making connections between cartoon-like pictures and real objects.

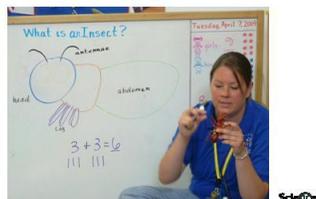
In fact, studies show that young children are able to make the link between a photograph and the real object it represents before they can make the connection between illustrations and objects.

Photographs are very valuable tools necessary in helping children learn science ideas and practice science process skills such as observing, describing, and comparing.

I would also like to talk about another kind of representational tool we can use to support science, and that is models. Models are three-dimensional representations. A globe is a model of the Earth, for example. A mobile with the sun, moon, and planets is a model of the Solar System. A puppet—if sufficiently realistic—can be a model of an animal.

Research has shown that models are more difficult for children to understand than two dimensional representations such as drawings or photographs. The difficulty has to do with being able to simultaneously see the model as an object in and of itself, and as a symbol or representation of something else. Consequently, models are used more effectively with older preschoolers than with toddlers.

Teaching with Models



Slide 35:

We can use models to support science in many of the same ways we use photographs or illustrations. Using a 3-D model of an insect may be a more effective way to help children learn to identify body parts than by looking at a small, live insect or an illustration.

For example, we can see the body parts of the dragonfly in the illustration, but it is much easier to appreciate the position of the legs by looking at the model. The model also conveys some sense of how the wings might move. Of course, only an actual specimen like this one encased in plastic can reveal how fragile the wings really are.

Let's look at another example. How might we use these dinosaur illustrations? Well, we could explore the mouths and talk about the likely diet of each dinosaur. In fact, scientists believe the T. Rex was a carnivore-see all those sharp teeth-while the ankylosaurus ate plants. Or, we could ask the children to compare the legs of the two animals, and to speculate how each might move.

It is easier to think about how the animals might have moved using the models. Clearly, the T. Rex had to walk or run on its two hind legs. Size and scale are often difficult to depict in 2-dimensional representations. The models also convey information about relative size.

Keep in mind, some believe that dinosaurs are not an appropriate topic, in general, for early childhood science. Between now and Webcast 4 we encourage you to think about why.

The print and graphics in books, photographs, and models are all representational tools that can be used to effectively support science in the early childhood classroom. These are only a few.

Science offers many, many opportunities to use a wide range of representational tools that not only support children’s understanding of science, but also the development of representational competence—that is, the understanding that things can be symbols for something else. Other representational tools include shared writing, posters, charts and graphs, and maps.

UP CG:

Barbara Dowling

2008-2009 National Head Start Fellow, Office of Head Start

BARBARA DOWLING: So far, we have talked about how teachers can use representations—oral or written language, photographs, 3-D models, or maps—to support children’s science learning. Children’s understanding is enhanced when they are encouraged and can create their own representations.

Children can represent their knowledge in a variety of mediums that contribute to literacy. These representations of visual forms can include...

Representational Drawing



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Slide 36

Drawing...

Representational Painting



Slide 37:



Painting...

3-D Models



Slide 38:



And creating 3-D models.

Let me illustrate with a few examples of visual literacy. In Webcast two we talked about classifying treasures and found objects that children brought from home.

Representations

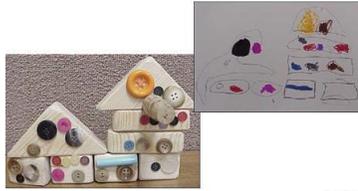


Slides 39:



These materials were used in the design and execution of models, and in drawings of those models using visual language.

Representations



Slide 40:

Slide 40

Each of these approaches or strategies asks children to extend their learning by engaging in careful observation and by recognizing shapes, forms, patterns, color, texture, and relationships between the parts of the models, objects, or pictures.

Sometimes children's representations do not perfectly reflect the real world. But they do accurately represent the child's understanding and serve as windows into their thinking. Let's look at 4 examples.

Observational Drawing



Slide 41:

Slide 41

Leah drew a picture of the squirrel we had seen on our walk one day. This picture led to a conversation that included the concept of the change of seasons, why squirrels gather and store nuts, and whether or not squirrels hibernate.

Children can also create representational drawings from information and knowledge they have— from a memory or from what they see... like Samantha, a child in my class. A relative was to have surgery and Samantha's mom had talked with her about what was going to happen.

Drawing from Memory



Slide 42:

SciEd

Samantha was then able to create this drawing of the organs of a body and share her knowledge with the other children in the classroom.

The examples of children's representations we have discussed so far have all involved drawings or 2-dimensional representations. Of course, children can also represent understanding by making three dimensional models ... or by combining two and three dimensional approaches ... as we see Isabelle and Caleb doing in these photos.

2- and 3-D Representations

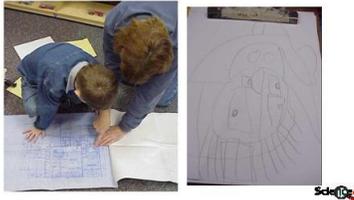


Slide 43:

One day Isabelle declared she wanted to make a plant out of play dough. She insisted she first draw it, or make a plan.

Another time, Caleb asked me to build a castle.

Making a Plan



Slide 44:

My response was: Blueprints are created by architects.

Building from the Plan



Slide 45:

Do you think you could draw a blueprint for a castle? Then we will know how to build the castle you would like.”

UP CG:

Shari Ellis, Ph.D.

Senior Advisor, Early Childhood Science, Office of Head Start

SHARI ELLIS: Many teachers regularly use journals to foster children's representational competence. Let's hear why literacy mentor and former teacher Michele Jones thinks journaling about science ideas is valuable.

Roll Tape!

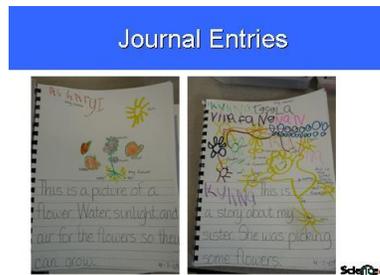
Journal: Michelle Jones

Incue: "We work a lot with language and literacy skills..."

Outcue: "...that work with language and literacy skills."

TRT: 1:40

SHARI ELLIS: Here are a couple of the journal entries that were created that day.



Slide 46:

These entries were created at the end of a project on plants. The goal of the journaling that day was to show what children could recall about plants. And I think these entries reveal that these children knew quite a bit.

Another way to use journals is to have children draw what they see. Let's hear about this approach from Dr. Kimberly Brenneman, who has been researching journaling practices in preschool classrooms.

Roll Tape!

Kim Brenneman One

Incue: "Good afternoon Dr. Brenneman."

Outcue: "...thank you very much."

TRT: 2:41

UP CG:

Barbara Dowling

2008-2009 National Head Start Fellow, Office of Head Start

BARBARA DOWLING: When Shari spoke with Dr. Patton Tabors, she asked what suggestions she would have for making journaling meaningful to dual language learners.

Roll Tape!

Patton Tabors Three

Incue: "I think that many of ..."

Outcue: "...what was going on."

TRT :41

UP CG:

Shari Ellis, Ph.D.

Senior Advisor, Early Childhood Science, Office of Head Start

SHARI ELLIS: The focus of this Webcast has been on the potential that science has to foster children's representational skills—specifically language and literacy. We have discussed how best to support children's word learning in science, talked about some criteria when selecting and using science books, explored how other representational tools such as photographs, models, and maps can support children's science understanding, and reviewed how and why to engage children in making their own representations.

Now we're going to take a short break and when we come back we're going to turn things over to our audience for our live Q&A session.

We'll see you in 3 minutes...

Roll Tape!

Reviewer Recruitment Video

"...among the first questions we should ask ourselves as teachers and educators are these: How can we help children find the meaning of what they do, what they encounter, what they experience, and how can we do this for ourselves? These are questions of meaning and the search for meaning (why? how? what?)."

—Carlina Rinaldi
Executive Consultant to Reggio Children

Slides 47:



"Ordinary moments fill most of the child's day. Indeed at the end of the day the ordinary moments constitute the child's story . . . they are the pages in the child's diary for the day. Once you understand an ordinary moment deeply, you understand children."

–George Forman

Slide 48:



"Incredible things happen when we are open to possibilities because the world is an astounding place. If we hold a vision that fills us with energy, takes us to our own edge, gives us the courage to soar, then we will be able to celebrate what's right with the world."

–Dewitt Jones

Slide 49:



UP CG:

Shari Ellis, Ph.D.

Senior Advisor, Early Childhood Science, Office of Head Start

SHARI ELLIS: Welcome back! Now it's time to answer your questions and here to help

Barbara and me in doing so is Dr. Jean Simpson from the Office of Head Start.

UP CG:

Jean Simpson, Ph.D.

Education Specialist, Office of Head Start

JEAN SIMPSON: Thank you, Shari. It's not too late to send your question in. Remember you can type your question into the "Ask a Question" form on the browser.

Our first question is from....

And our final question is from...

Thank you Shari and Barbara, and thanks to all of you for your thoughtful questions. As we leave you today we would like to offer you two questions to reflect on:

Reflection Questions

What opportunities do we give children to represent their learning and to communicate their own scientific thinking in a variety of mediums?

Slide 50:



What opportunities do we give children to represent their learning and to communicate their own scientific thinking in a variety of mediums?

Reflection Questions

How do we encourage and support children to explore and to take risks as they justify their scientific thinking?

Slide 51:



How do we encourage and support children to explore and to take risks as they justify their scientific thinking?

This concludes our third Science Webcast. In our final episode in this series on Thursday, May 21st, we will talk about creating environments that promote science learning.

In the meantime, please visit the E-C-L-K-C for additional information concerning science, and please feel free to send any suggestions you have about these Webcasts by e-mail to the address at the bottom of your screen.

UP CG:
ScienceWebcasts@esi-dc.com

Once again, thank you for taking the time to be with us today. I hope you are inspired to discover the science that happens around you each day!

We'll see you May 21st for our final Webcast. Until then, take care!