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Jean Simpson: Welcome to Discovering Science. This is the fourth and final episode of our series on building the foundation for science in the early years. 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.

During the first webcast, we explored what science looks like in early childhood settings and discussed some of the challenges in creating quality learning experiences. We also discussed goals for science in the early years, including fostering children's curiosity, building their foundational knowledge about the world, and helping them to develop basic scientific thinking skills.

In the second webcast, we focused on the development of five, key science process skills from birth to five: using the senses for learning, observing, classifying, investigating, and predicting. The third webcast focused on several ways teachers and parents can foster development across domains through science experiences, with an emphasis on age appropriate literacy.

During today's webcast, we are going to discuss how to create environments to foster science skills and understanding. Our experts for this webcast are Shari Ellis, Barbara Dowling, and Michele Plutro. Shari is the Senior Early Childhood Science advisor for the Office of Head Start and 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 Head Start fellow in the Office of Head Start. My colleague, Michele, is also an education specialist in the Division of Educational Development and Partnership at the Office of Head Start. Shari?

Shari Ellis: Thank you, Jean. It's great to be back with you. I hope you find today's program useful and informative. The information in today's Webcast is organized around some of the thoughtful questions we have received from you -- the viewers.

Our responses to the questions reflect additional thoughts from the panel of experts who generously shared their wisdom and experience with us earlier this year. You have been introduced to some of them in previous videos. We are grateful for their contributions and recognize them in the credits at the end of this webcast. As in the past, we will take more of your questions later in the webcast.

You can simply type your question in the "ask a question" form on your screen. You can also download a copy of the learner's guide for this webcast by clicking "learner's guide" located at the lower portion of your screen. We will also e-mail a feedback form, inviting your continued comments on the science series and your suggestions for the future.

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 ECLKC.

Barbara Dowling: Let's begin our conversation today as we did in webcast one, by reflecting on what science looks like in early childhood. One of our experts, Karen Worth, Provides an informative overview. Let's listen now.

[Video begins] Karen Worth: We begin an inquiry by exploring a phenomenon. What is it? Finding out what it does. What does this water do when I squirt it and dump it and play with it? What kind of questions do I have about it? Sometimes there are obvious questions and sometimes there are other kinds of questions. If

we want to pursue this, we want to go deeper, we think, okay, what's the question we're really trying to explore? We move to wondering about that. That focuses us a little more.

Just as a young scientist would, a young child starts to say, well, I'm going to try this and that, predict, think about what might happen, or I'm going to collect data in a child-like way. And then you start to think about what does all that mean? Are there some connections, relationships, patterns that we can find in this? Sometimes we find them, sometimes we don't. And from that comes a -- in not child-like words, but an idea, or a claim.

I think this is what's happening. This is why I think so. Maybe it's because it was this, or maybe it's because of that. So, it's a process that isn't linear at all. It's messy. But it does start with the question, prediction. It moves to an investigation. And it draws conclusions from data, from the real experience. If you and I disagree, we have to go back to the phenomenon. We can't argue it out. We have to go back to the phenomenon, to ask the question of the phenomenon again to see whether one of us is... more right than the other.

Shari Ellis: What is the role the teacher, parents, or other adults play in helping foster those kinds of inquiries?

Karen Worth: I think there are many roles that adults can play and they depend a little bit of the comfort of the adult in engaging with this. But I think any adult with simply be interested in and support children's questions, just by -- oh, that's an interesting question. I wonder if we could do this. Maybe we could. Just that very beginning stages. Maybe if we go out and find this little piece of material we can work in.

This ball rolls down, but I wonder if this funny-looking football will roll

down. Just encouraging that initial exploration, I think, is the baseline and bottom line. I think parents can do this and teachers should do this. Ideally, one would like parents, but ideally, we want to expect our teachers to go further than that. And that means thinking through, what is it that would actually -- what is it the children can explore here?

What can they -- how can they focus on this phenomena and manipulate it and play with it and change it and how can they gather some new information about what's going on, some new data, if you want to call it that. We don't use those words necessarily. And then what does that make us think now? So children are often -- of when we get them to predict, we say, well, why do you think so? Because we are looking for those theories. They have theories about most everything. And ideally, we would like to extend their experience and push them also, encourage them, to come up with new theories, or indeed, oh yes, I was right. My theory was right.

So I think that what adults are doing in the classroom is to help children move through this process of inquiry and go deeper than they would by themselves by asking questions, following up on predictions, providing a material-rich environment, using data collection mechanisms -- journals, notebooks, whatever we call them, and then helping children to really think about what they've done. Reflect on what they've just done. And really try to draw conclusions that go beyond what they've done before. That's new theories. [Video ends]

Barbara Dowling: As we heard, children's questions are the starting point for science in the early childhood years. Many of the questions emailed from you ask how to find and support children's inquiry and questions.

Michele Plutro: Thank you, Barbara. Let's look at some viewer questions. Today's

webcast will answer the following questions:

What can I do to create environments that inspire children to ask questions? How can I become more aware of children's questions? How do I decide which science questions to explore? What kinds of tools or materials are most helpful in supporting children's inquiry? How can I help families engage in children's science learning? What can I do in terms of professional development to become more knowledgeable and skilled at supporting children's scientific inquiry?

Shari Ellis: Some of you have written to say that you need help creating environments that lead children to ask questions. When we use the term "environment" in relation to the early childhood, we often think of the physical world -- furniture, equipment, books, computers, and the outdoors. We are going to describe some types of materials used in learning environments. But the first steps in creating an environment that leads children to ask questions involve teacher and child attitudes toward, and dispositions for, inquisitive learning.

We are going to highlight three beliefs and dispositions that are key to a supportive learning environment for science. These features are important across the grades for learning science -- not only in early childhood settings. The first belief is that all children can successfully experience, and learn science.

We received a number of emails from viewers who are intrigued by the stories Barbara has shared about her teaching experiences. Several of you are curious about the composition of her classroom. Specifically, you wonder whether Barbara happens to have an extra special group of children. Barbara, could you share more about the children in your classroom?

Barbara Dowling: My classroom is filled with children very much like yours in

many ways. They are a diverse group of children, many facing challenges in a variety of areas. I firmly believe in addition to the gifts of the children, it is about the teaching and my attitudes about children and how they learn. In other words, my the image of the child makes all the difference in how children interact and learn. I believe that all children who enter my room are competent, capable, and full of wonder and possibilities.

They come with so many ideas, eager to learn and many experiences to share -- and even more they want to have a head start. They are creative and curious about nearly everything around them, and how and why things happen. My teacher roles are to carefully observe, to really listen, to engage in dialogue with the children, to create moments that surprise and delight, to fill each day with possibilities, and to be engaged with the children in the process of learning.

When engaged with the children, you really see discovery unfold and you join in the joy and amazement of the ah-hah moments. This is what sustains me as a teacher. It also creates those dispositions for young children to think like a scientist -- being curious -- investigating, collecting, recording precise data, cooperating, communicating, seeking answers, asking new questions, and persisting.

Shari Ellis: Barbara embodies another critical feature of a science-rich environment -- a teacher who is deeply curious and motivated to learn. Recall from Webcast 1 that science is learning about the world and how it works. To engage in science requires that one approach the world with a deeply questioning mind -- some would say a sense of "wonder." Teachers and parents who model curiosity and an interest in finding answers foster these dispositions in children. A third feature of a supportive science classroom is one in which it

is safe to take intellectual risks.

So much of science involves exploring materials and ideas that one knows little or nothing about. By definition, science often involves being uncertain, surprised, and even totally wrong. Science is also a social activity. Recall from Webcast 2 that sharing discoveries with other people is a basic science process skill. Our confusions and errors as well as our discoveries are generally public. Science cannot be enjoyed when we are afraid of making mistakes or looking foolish to others.

Successful science environments are those in which teaching creates an atmosphere where Children feel comfortable taking risks in learning and communicating with others, and where all children are valued for their ideas. We have also received a number of emails asking for help listening for children's questions. Another expert who contributed to this webcast series is Dr. Lilian Katz. She shared a delightful story that illustrates both how to listen for topics that can develop into investigations, and how to have a conversation with multiple children.

Michelle Plutro: There were a few four years old sitting together in their preschool class and three of the children were wearing sneakers that would light up when they stepped on them. The teacher said, "Wow look at your shoes, that's cool! They light when you step on them." Christian said, "Yep they do! Watch!" and she jumps up and down several times. The teacher asked, "How does that happen? How does it light up?" "Cuz they're new," she said. The teacher said, "Well my shoes are new too but they sure don't light up."

Sean said, "No, because they light up when you step on them and steps down hard several times." The teacher said, "Okay let me step on mine. That's funny mine

don't light up when I step down." Karlie added, "no, no, no, you have to have these holes." and points to the holes in the shoes. The teacher pointing to the holes in her shoes said, "Well I have holes in mine and they still don't light up and Josh has holes in his sneakers too and his don't light up. I wonder why?" Then Rachel chimed in, "I think you need batteries. Keds need batteries." Christian said, "Yeah, you need batteries to make them work!"

And then she thinks, "But I didn't see batteries when I put my toes in." "I think they're under the toes," Michael said. Sean said, "I can't feel batteries under my toes." then the teacher said, "I wonder how we can find out about this?" and that lead them into an investigation.

Barbara Dowling: So how is it we become aware of children's interests in ordinary moments like this? One tool teachers can use to help them recognize children's interests and questions is "learning stories" first developed by Margaret Carr. A learning story can be about a single child or a group of children. "learning stories" bring together a teacher's observations and wonderings about a child's learning to make the child's learning visible. Generally, learning stories have four parts to them: a narrative, a reflection, opportunities or possibilities, and at least one photograph. These parts can also be referred to as what? So what? Now what? So how does a teacher go about creating a learning story? First, choose the subject. You can find an activity that amazes you, or one that will make learning visible, or one that has the potential to lead to deeper and richer learning experiences that you have captured in photographs. Begin by writing the narrative which describes the context of the learning.

Write about what the child does and says, focusing on the positive. Then write

your reflection, which is an analysis of what the child was doing. And ask yourself, "What is this child trying to make sense of? What strategies are used? And what is the significance of what you saw?" the third part, opportunities and possibilities, focuses on what you do to make this learning deeper and more complex, and what you can do to provide support so the child or children can achieve their goals.

Now let's look at an example of a learning story from Tom Drummond, of North Seattle Community College. We thank him for this contribution. The story is, “Josie Drips Down a Hill.” We begin with the narrative, the "what" of the learning story. Josie had been painting a while when I saw her make a hill by pushing the paper toward the paint tray. I had never seen anyone do this before, so I began to take pictures.

Josie was closely watching the paint. Josie touched the brush to the painting at the top of the hill. A drip slowly ran down the hill making a blue line. Josie filled her brush again and added more blue paint at the top of the slope in the very same place. She added paint to the pink area on top. This second drop of paint began to slide down the hill through the pink area. The first drip line was now all the way at the bottom. Josie watched intently as the drip slowly made its way to the bottom of the hill. Josie pushed the paper toward the paint tray and made the hill steeper.

The drip was going almost straight down now. She added more paint to the top. Josie watched intently as the drip slowly made its way to the bottom of the hill. Now let's look at the teacher's reflection, the "so what" of the learning story. "Josie, you discovered how to make paint draw a line by sliding down a hill. You concentrated on how it moved. Not only were you a painter, today you

were a scientist. You did an experiment. You watched the effect of the hill on the drip that you caused. That careful looking is how scientists discover how things work. You wondered about something and you figured it out."

The third part of the learning story, the "now what," looks at opportunities and possibilities that can be considered for further study. The teacher determined that Josie seems to have a disposition to wonder and be intrigued with the physical properties of paint that is worth exploring in greater detail. They could bring out the easels tomorrow with thick paint and water that she can mix. Eye droppers can help, too. You will want to show these drip lines to the other children, for it may spark their interest, too. Then a group of children might have some ideas of what to try next.

As you see, learning stories offer a powerful and compelling view of children's learning and in this example, scientific thinking. They help the teacher plan appropriately to both support and to challenge children. Learning stories also allow us to revisit key experiences with children. Revisiting an experience with children allows us to create shared meaning; to allow children to clarify their own thinking, and to support children in moving toward a new level of complex thinking. I will talk more about learning stories and the important role parents play later in the webcast.

Shari Ellis: Today we also want to offer some additional criteria for you to consider when you make decisions about the kinds of questions and studies to pursue with children. Karen Worth and other experts in this Discovering Science series are advocates of inquiry science. They shared with us inquiry science involves "hands on exploration" that allows children to ask a question, make observations, engage in investigation, and share their discoveries.

Inquiry science begins with open-ended questions that lead to real investigations -- not those follow-the-recipe kinds of science experiments that you might recall from chemistry class. Inquiry science is definitely not memorizing facts, and it is not learning science from a book or a video. Advocates of inquiry science at all grade levels, not just with young children, explain that the best way for students to learn science process skills is to use them to answer a question they are curious about.

There is abundant evidence that comprehending science facts and understanding concepts increase when they are learned in a meaningful context. So how do you decide what to explore? Let's listen to Karen Worth offer insight on selecting topics.

[Video begins] Shari Ellis: What factors should teachers think about when they're choosing science topics to explore and investigate in-depth in the classroom?

Karen Worth: Well, I think there are a number of them, and I sort of have a little, kind of -- almost a checklist, but it's not, way of thinking about what they're -- what kind of things to think about. When we think about what content should be, or what the focus of the investigation should be. One of them is that it's got to be something that is intrinsically interesting and fun for children.

I would almost add that it should be fun for the adult too because that way the adult brings the same kind of enthusiasm and interest to it. So that's of course, one. I think it has to be developmentally appropriate. There are many definitions of developmentally appropriate, I won't try go there. But I think, part of that, is that the phenomena has to be accessible, directly through experience. Not all of it, necessarily, but there's the directness, the

immediateness of it.

And I also think that it has to have -- you have to be able to go far enough in exploration like in water or building or plants or whatever, so that the child can go far now have actually come up with a conclusion. If you play around with magnets, for example, once yen they stick or don't stick or repel or don't repel, you're done. You can't go much further. Whereas if you explore something like water, you can really move further.

You can go into it in some depth. So that's a sort of developmental issues, as well as others. Um, and of course I want something you can go deeply into, and some phenomena you can and some you can't in the classroom, specifically. I also think you want to think about, are these important science ideas? I mean, there are many possibilities of what you can explore scientifically in a classroom.

There are also some very foundational science ideas. Life cycle is a foundational science idea. The idea of balance and equilibrium.

That influences me as well. That would tell me how I think about looking at living things. That would tell me how I think about using the block area. That water flows in interesting ways and that water has pressure when it moves. Those are interesting foundational ideas about the nature of liquids. So I think about that as well. It doesn't tell me what to teach, but it tells me what materials and experiences may be most appropriate for young children.

Shari Ellis: Those are very interesting. Do you have any others that you would add?

Karen Worth: Well, one thing I would like to add is that I think if we look at classrooms, many childhood classrooms, there are a number of things that are there that are called science that are used in science. If I think about some of

them, they include such things as rain forests and dinosaurs and magnets, as I mentioned before. And I think that we have to -- to me, it's tremendously important that what we do with children in science goes deep and goes over time and draws from what's immediately accessible to them.

And there's nothing wrong with those other topics except they don't engage students in the real scientific process of investigation, and the rain forest is a habitat. Their backyard is a habitat. Penguins, no. Why not lilly bugs from outside, or insects? I think we want to be very careful that the piece of science, at least, that is investigative, or inquiry-based, science is focused on the things that children really have around them, can go deeply into, and not the things that are more topical, if you will, rather than based in some of the big ideas.

Barbara Dowling: Karen listed several criteria to consider when selecting topics to investigate. We will elaborate on a few of these. First, the question or topic must be interesting to the child. That question or topic should interest the teachers as well. Other important criteria are: The topic can be explored in depth and over time; it can be experienced directly, and there is the potential for children to learn about "big science ideas." We will describe these three additional criteria in more detail.

Why is it important to be able to study a question in depth and over time? This issue is sometimes the focus of debate in K through 12 science reform efforts. Some say that science education in the United States is wide, but shallow. That is, school-age students know a little about many science topics, but often lack a depth of understanding of any of them. In other words, our students memorize a lot of facts, but have few opportunities to use the science process skills that

are valuable beyond the classroom.

How do these observations apply to early childhood? The wide, but shallow approach to science is often reflected in early childhood settings when teachers select a hodge-podge or other random collection of science activities such as growing beans one week and mixing colors the next. It's almost like, how much can we cover, rather than how deep can we go using science process skills to uncover many ideas about a single concept. From birth to five, our goal is to introduce the children to a variety of objects and events while being sensitive to individual interests and temperaments.

For example, from very early on, there are children who will explore a toy or other object for a long time, while other children lose interest very quickly. But, as children's attention and self-regulatory skills mature, they are able to explore materials in-depth. This in-depth exploration provides opportunities for children to practice science process skills, build deeper understanding, and acquire knowledge.

Adults play essential roles in helping children develop exploratory skills. Adults facilitate children's explorations by asking questions, drawing children's attention to details, and by selecting appropriate materials and experiences. An example of science that is difficult to explore, is what Karen referred to as magnetism. The science behind magnets quickly becomes complex and beyond children's grasp. Of course, magnets seem to be a permanent part of many early childhood settings.

If teachers facilitate children's initial explorations with magnets and rotate a variety of different kinds of magnets and test objects in the science or discovery area, magnets can be a valuable tool for discovery. They do not,

however, support in-depth exploration of related scientific concepts such as electrical fields or polarization.

Shari Ellis: Another criteria to consider when selecting science topics is whether it can be experienced directly by young children. The reason the topic of dinosaurs is rejected by many for inquiry science is that children cannot explore or experience them directly. There are a number of science topics that appear in early childhood classrooms that are nearly as inaccessible as dinosaurs.

These include exotic environments such as the rainforest, Antarctica and oceans, or the solar system. What about animals? If licensing permits live animals, then children can have some direct contact and experience with them. But, when live animals are not an option in the setting, does that mean animal studies are "off-limits" -- or limited to mealy bugs and other insects in the local environment? Barbara, how do you respond to this issue?

Barbara Dowling: I am fortunate to live in a farming region where it is acceptable and allowable to have live animals in the classroom, and it is easy to find permanent homes for them after our studies. I am aware that many teachers feel their most successful science projects involve live animals -- be it hatching tadpoles or caterpillars, or observing other small animals such as worms and snails. But even in my region, children express interest in animals that live far away, or that cannot be easily explored directly.

The live animals, even the smallest ones, do pose challenges related to individual fears, sanitation, health, and safety. And there are ethical issues involved in caring for animals. We need to ensure their survival, which means we do not hatch caterpillars when it is too cold to release the butterflies

outdoors. And, we need to select species that are native to our location, or find a zoo or facility willing to contain them. So, you wonder whether it is appropriate to substitute less hands-on or less direct experiences with animals for direct experience with live ones?

It is helpful to reflect on several questions. The first, is it possible to find materials and activities to create experiences for in-depth exploration? Another question comes from expert Karen Worth, might the exploration foster an understanding of important science concepts, or big science ideas? What is the potential to connect with big science ideas? When evaluating whether to begin any exploration, it is important to reflect on what science and understanding you would like to foster.

For example, hands-on experiences with live animals can be an extremely effective way to foster an understanding of what it means to be a living thing. Feeling a small animal's heartbeat or its breath on your skin, watching it move, or making sure it has proper food and shelter makes clear some needs of living things. Are there other big science ideas that can be addressed less directly or less hands-on? And how might we figure out what some of these big science ideas are in the first place? Michele?

Michele Plutro: We have also received several emails asking if there are core science concepts, in other words "big ideas" that should be covered during the early years. Let's compare this question with our series on math. In the Office of Head Start math webcasts, for example, we covered both math concepts and mathematical skills and thinking. In this series, some of you have noticed that there are few specific recommendations regarding science content.

Rather, there has been constant focus on five science process skills, and

teaching methods and strategies that support children's experiences and learning of these skills. We have demonstrated through approximately 40 videos that there is science content being talked about, learned, and even challenged by the some of the children, and Barbara and Shari have shared many examples of where appropriate science content comes from. One reason we have not focused more on specific content and concepts is that there is relatively little consensus regarding what is the most important science content during the early years.

This was not the case with math. Professional organizations such as the National Science Teachers Association and the National Academies of Science have primarily offered content frameworks for K-12 science. This is in part because there is insufficient research upon which to base such preschool frameworks or content recommendations. However, research has shown that young children are very capable of developing a rich understanding of their world and how it works.

How does this understanding develop?

Well, they must have frequent opportunities to pursue their scientific interests and frequent opportunities to learn and use science process skills. They must also engage in thoughtful and planned experiences that allow science ideas to be explored in-depth and over time. I hope this has been clear through these webcasts that we, along with the experts, have described the importance of early childhood science in the development of thinking and communication skills, and for developing dispositions such as curiosity and persistence rather than the mastery of isolated facts.

All of that said, early childhood science, like other domains of learning, needs to revolve around worthwhile content. While you look not only to the children but also beyond the children, where can you go to identify additional content,

concepts, and these big ideas that might help you support children's learning now and to lay the foundation for later science learning?

One place to start is your local curriculum. You may also want to reference the Head Start Child Outcomes Framework, the Head Start Leaders Guide to Positive Child Outcomes, or your state or county early learning standards. While many states emphasize the science process skills as we have, some state standards also offer very clear "big science ideas" such as "what living things need in order to survive." I am going to ask Shari if there are other big science ideas that you could share?

Shari Ellis: Well, one is the distinction between living and non-living things. A defining feature of living things is reproduction. A related idea that young children can explore is that offspring look like their parents -- kittens look like cats, puppies look like dogs, and seedlings look like mature trees. Karen Worth mentioned "life cycles" as a big idea. A related idea is simply "change." This idea could be investigated over and over again with explorations focused on growth, decay, leaves, and even changes in states of matter, like ice and water. Discussions of the human body often focus on body parts -- both the observable on the outside and the bones and organs on the inside. The idea of "insides and outsides" could be expanded to other natural things such as plants and seeds or objects made by people such as toys and machines. The list of potential "big ideas" is almost endless. Another place to look for ideas is a new science resource already beginning to appear on the ECLKC, Marvelous Explorations through Science and Stories or MESS. MESS was funded as an innovation and improvement project by the Office of Head Start.

There will ultimately be 10 mess guides available on the ECLKC. Each guide is

designed to help teachers create opportunities for children to engage in important science process skills and learn foundational science ideas.

The background information answers questions teachers might have about the content area and targets the big ideas to be introduced. The guides also include recommendations regarding materials to use to support investigations including tools, objects, and books. To illustrate, let's return to our discussion of animals.

In my experience, efforts to explore animals indirectly in classrooms are often not very scientific. This is true whether the focus is on familiar pets or animals that live in far off, exotic locations. For example, it is common to see animal explorations organized around the idea of animal homes or habitats. This can be a great start but it is less so when homes and habitats are interpreted as animals that live on farms, animals that live in zoos, and animals that live in jungles. This organization is not based on a scientific classification scheme and it can be confusing.

A tiger might be a jungle animal, zoo animal, circus animal, and where I live in Florida even a farm animal. Science ideas about animals can be accurately and productively explored in the absence of live specimens by using objects. You might want to reflect on our presentation of object learning in Webcast 2. An example of such an idea is that animals have different adaptations that help them Survive. One hands-on way to investigate this idea with young children would be to explore body coverings. For example, here I have a board that has body coverings of different mammals.

Objects can be used to support rich conversations about the functions of fur, a hard shell, and different types of feathers. With the support of MESS materials,

even dinosaurs can be studied in a way that builds scientific understanding although it is impossible for anyone to experience ancient life directly. An important science idea here is that scientists study fossils to learn about animals that lived long ago.

Although the concept of geologic time is beyond the grasp of young children, and most of us, they can understand that there are rock-like remains of animals that lived long ago and that these remains take the shape of bones, teeth, and even remains preserved inside a rock or other matter. Hands-on exploration of fossils provides opportunities to practice observation and classification skills and can lead to further exploration of what animals eat, how different animals have different kinds of feet and leave different tracks, or even to a broader investigation of bones.

In our last "save-the-date" announcement, we asked you, the viewers, to share science resources you find helpful. Such resources, when you choose wisely, might also help you identify important science ideas and concepts. Are there other big ideas to share with our viewers?

Barbara Dowling: We've shared some examples of object-based learning to illustrate that there are many ways to teach science well in the early childhood setting. Inquiry science, based on questions children generate from their direct experiences, is a wonderful way to support the development of science process skills and knowledge.

Objects are another way to both inspire and to answer children's seemingly endless questions. What kinds of tools or materials are most helpful in supporting children's inquiry? This leads us to our next topic for today: what kinds of materials are helpful in supporting science in the early childhood

classroom?

Michele Plutro: When we assembled the panel of experts to discuss early childhood science and to gather suggestions for possible content of these webcasts, we asked them if there are any “must-have” materials for early childhood science. There was remarkable consensus among the experts and you might be surprised by those suggestions. Although we do not have time to review all of their ideas, Barbara and Shari are going to share a few that will be helpful and available to all.

Barbara Dowling: Panel members emphasized that books, especially nonfiction titles and realistic photos are essential supports for science in early childhood. As we discussed in Webcast 3, these tools can jump start investigations, serve as sources of information, and help children make connections between the real world and the representations. The panel held strong beliefs about the central role that nature plays in early childhood science. We can see that many of the materials that offer big ideas for scientific study are those found in nature. The wonders of nature intrigue children.

They naturally enjoy observing and thinking about nature. It is a free ever-changing laboratory where many phenomena can be discovered and investigated. The best thing is that it is just outside your door whether you live in a rural area or an urban area, it's there for you to explore. So what does nature offer? Go outside your center and stand still. Close your eyes and listen. What do you hear? Can you hear the birds? The crickets? The sounds of construction work? Walk around the building looking at the environment at the child's level. What do you see?

You may be surprised how different nature looks from that perspective. Look up. What do you see? Clouds, the sun, the moon, birds flying? Look down at the ground or the sidewalk. What do you see there beneath your feet? Perhaps it is a snake or insect. Lots of what we find right outside in our natural world: dirt, water, plants, worms, spiders, ants, birds, rabbits and squirrels attract and hold children's attention for hours and possibly days. Children can also observe, reflect, record, and share nature's patterns and rhythms. If you model discovery on walks with the children, they will learn to discover.

Not only is nature a great laboratory for scientific investigation, it offers other benefits. There is much research happening in regards to the effects of nature having effects on children and positive experiences. Some of the pertinent findings are: being outdoors helps create a sense of wonder which children can carry over to other aspects of their life. Being in nature helps children to become more aware of their world. Nature gives children the chance to engage all their senses, and as we discussed in Webcast 2, using senses to explore our world is one of the key science process skills.

A recent Canadian study found that children whose school grounds include diverse natural settings are more physically active, more aware of healthy nutrition, more respectful to one another, and even more creative. The opportunity to explore nature helps children improve their attention spans and learning. By studying science, through outdoor experiences, children can connect to their local environment and become stewards of their community's natural resources. Remember, if you are excited and amazed by nature, your children will be too.

Shari Ellis: Another category of materials offered by our expert panel was to create collections. With appropriate safety rules and supervision in place, even

the youngest children can safely explore the natural world by bringing collections of natural items into the classroom. Collections are an important science resource in any early childhood setting.

Do you recall Barbara's discussion of collections in Webcast 2 where we presented very young children exploring collections, sorting, and classifying? Collections are a great way to foster an appreciation of the similarities and differences in all types of objects -- things like shells, rocks, and even dead insects. Older children can use collections to help answer science questions. You might remember this story from Dr. Katz. The project began with a basic question about whether all balls are round -- and whether then, all spherical objects are balls?

To help answer this question, the class ended up with a large collection. There are a number of scientific fields that study collections. For example, at the Florida Museum of Natural History, where I work, there are over 28 million specimens and objects!

Scientists from all over the world come to the museum to study the collections to answer many different questions about climate change, the origins of disease, or the similarities and differences among plants and animals found on the earth. They are not doing inquiry in the same way that scientists do experiments, but they are beginning with a question they try to answer using careful observation and other scientific tools.

Barbara Dowling: Although I talked about collections in an earlier webcast, I want to take this opportunity to point out that collections can also be used to support children's interests that cannot be explored in their immediate environments. You might wonder how Tommy, a young child growing up in South

Dakota, developed a passion for seashells. Well, Tommy's grandmother lives on the Oregon coast and so he gets to hunt for seashells when he visits. I do not generally provide seashell collections in my classroom, but that year I did and it grew into a marvelous exploration.

Shari Ellis: Our expert panel also emphasized the importance of investing in high quality science tools that can be used to explore many different topics. I have some examples here with me today. They include clear containers such as these that can be used to collect insects and other specimens and do different kinds of mixing, of course of course good quality magnifying tools, both hand-held and table-top as well as microscopes are wonderful tools.

The experts discouraged us from spending funds on expensive materials that have a single use. Instead, they suggest frequent use of recycled and found materials as well as materials acquired from families or inexpensive items from hardware stores, all materials that can be used in many ways. This video clip provides a nice example.

[Video begins] Narrator: In this video, a young boy investigates the movement of a seesaw plank that pivots on a section of pipe laying on the ground. Watch the number of ways he experiments with the pivoting board. He does not seem to have a particular problem to solve. He has assumed the playful mindset of a scientist. Trying to understand the pivoting board. Trying this. Changing that. Seeing if he is correct in his assumptions. The scientist seeks knowledge of a domain. Its structure, limits, impossibilities, as opposed to engineering a solution to a particular problem.

And in play, the child also cares less about achieving a single goal and cares more about figuring out why on that attempt something works, but on another

attempt, it did not. Here are some specific thoughts that he may have. Should I stand on either side of the pipe? Do I get screened when I jump off one side? Can I make the board go back and fourth without changing the position of my feet? Is one side harder to push down than the other?

Does it help to hold my arms out? Should I spread my feet even further apart? Can I make one side pop me up? Do I place the center of the board in the center of the pipe? Playgrounds need movable objects. Objects that afford experimentation, objects that have the appropriate scale and strength to allow children to assemble, climb on, test, and reassemble in another way. [Video ends]

Barbara Dowling: Thank you Dr. Forman for providing that wonderful footage of the little boy experiencing physics on the playground. Our experts also observed that it is very enriching to teach science with a digital camera and access to a color printer. Wouldn't it be ideal if teachers had access to a camcorder as well? Digital cameras and camcorders can enrich investigations in many ways. We can use photographs to document children's investigations. We can show the changes that occur in an experiment, or take photos of the outdoors so that we can study them in the classroom.

Photographs and videos are wonderful ways to support conversations with children about what they were doing or thinking during their explorations. And, as I described earlier with learning stories, photographs also can be used to help teachers reflect on and improve their practice. Similarly, by documenting children's learning on film, we have a ready tool to communicate with families.

This brings us to our next question -- how can we help families support children's science learning? Several of you have emailed questions that fall

into this category.

How can we help families to engage in children's science learning? I'd like to begin to answer this question by describing how the learning story tool we talked about earlier can be used to engage families in their child's learning. Remember that a learning story is first and foremost an interesting and engaging story that makes visible a meaningful and valued learning experience. At the end of the learning stories is a blank page titled "parent voice." Here is what Josie's parents wrote: "Josie, you are amazing. I see you do this kind of close looking many times. Now you can see yourself doing it."

"It was a joy to read this story to Josie. We read it over again and again. I never would have paid any attention to those horizontal lines at the bottom of her painting without seeing the pictures of her absolute concentration in making them. Thank you, teachers, for stopping to look at this precious person we love." What an incredible reflection from Josie's parents. In making learning visible we are able to inform parents, ourselves, and others of the incredible competence of young children and their understanding of the world.

These stories, done well, help foster home/school communication. They inform teachers about children's learning and they point to additional opportunities and possibilities to further develop children's strengths and interests. Additionally, they inform parents about their child's learning, allowing the parents to deepen their understanding of their child's strengths and interests. By including a blank page for the family to respond with their ideas and reactions, learning stories also encourage parental observation and dialogue with their child and with the teacher. There are other simple techniques to help parents become more aware of their children's questions. Dr. Jennifer Jipson

suggests parents make a list of their children's questions over the course of a few days or a week. You might be surprised at the kinds and variety of questions that children ask. Let's make another visit to Sid the Science Kid to listen to how children ask questions.

[Video begins] Sid: Thanks for making pancakes, mom, but can I ask you a tough question?

Sid's Dad: of course you can. Ask away.

Sid: If your pancakes started out as this soft, squishy batter, how come they end up so black and hard?

Sid's Mom: Sid, sweety, that is such a great question. I think it belongs in the question box.

Sid: oh, the question box is one of my favorite things ever. See, when I come up with a good question, mom writes it down and puts it in the box.

Sid's Mom: Why don't you try the pancakes I made?

Sid: Mom, I've got another tough question. How come your pancakes turn out so gooey?

Sid's Dad: Now that's an even better question, Sid. In fact, I think it belongs in the question box, too. [Video ends]

[55:12.0]Michele Plutro: Another way to engage families in children's science learning is to create science experiences that children can do at home with their families. One very successful way teachers accomplish this is to ask children to collect data in order to answer a question. One delightful example that Dr. Katz shared at the meeting involves the concept of a chair. The children were provided clipboards, drawing paper, and pencils to take home. They were asked to look around where they live, and draw anything they see that they could sit on.

The variety of objects that children described was remarkable. There were high chairs, rocking chairs, toilets, and even shopping carts. The children began to refer to this kind of assignment as their "home-school-work." Home-school-work is always done with an adult and is related to what is going on in the curriculum. It engages adults in exploring with their children and it helps them understand what their child is learning.

Shari Ellis: There are more wide-reaching ways to engage families in children's science learning. These include summer science programs, family science nights, and inviting parents on science-related field trips. In our work at the museum, we have found these strategies can be highly effective and perhaps life-changing. Let's listen.

[Video begins] Betty Dunckel: During museum visits, children can see a lot of different kinds of objects that illustrate scale, textures, colors, diversity, that can compare and contrast with resources that they just don't have available within their classrooms. Oftentimes, out-of-doors is a scary place if you're not accustomed to being in it. By visiting a museum, we can engage you in different kinds of exhibits and environments that may make that first foray a lot more comfortable and have children have the opportunity to have both hands-on and close encounters with things in a less threatening environment.

Instructor: I think some of you that have never been to the beach ought to see a jelly fish. Do you guys see any eyes on the jelly fish?

Children: No!

Instructor: No, there's no eyes on them. But these things here, these things are stingers.

Child: It get burned really badly.

Instructor: Do you remember these big butterflies with the eye spots? Does anybody remember what they're called?

Child: Yes.

Instructor: Blue Morpho. Want to see one of the big Blue Morphos fly? Now you see how I very carefully picked them up? It takes a long time to learn how to pick them up without hurting them. Aren't they beautiful?

Instructor: This is a millipede. No, nothing in here -- nothing in the museum is alive and nothing is going to hurt you, so you don't have to worry about a thing. This is all stuff that you can touch.

Child: I found the mice.

Instructor: You found the mice? Where, show me. You know, I have never seen one in here before. You've got good eyes.

Betty Dunckel: We know from talking to a lot of scientists that their first museum visit was often something that sparked that initial interest, in whether it be paleontology, or etymology, astronomy. All kinds of things that capture that first initial interest and motivation to learn more about a particular topic.

Ann Crowell: There are many adults who have not had experiences in museums, and for the most part, this is a free resource within our community. And if we're to promote family interaction, or parent-child interaction, what more wholesome place can they come than a museum where they can rate at their own rate of comfort, they can explore, and they can always come back to revisit it. I think once a parent grasps this, then the children will continue to expose themselves and then future generations will know how important museums are.

Betty Dunckel: Within our communities, we have absolutely wonderful science

resources that children and families, classrooms can take advantage of to really enhance what goes on within the classroom setting so that it can really illustrate some of the concepts the children are learning, expand their language, and provide additional kinds of opportunities that can't take place within a classroom. [Video ends]

Shari Ellis: The final question we would like to address today is where should you go from here in terms of professional development. Michele is going to cover this very important topic right after we return from our short break. We'll see you in 3 minutes.

Narrator: The Office of Head Start is actively seeking new Head Start and Early Head Start grant reviewers. Please visit the website on your screen to get involved in the effort to provide and expand high-quality head start services across the country.

Michele Plutro: Welcome back. I'm happy to be here to talk to you about some of the important questions, where can you go from here? It's important to be answered in two ways. Where do you as an individual go in your professional journey and where can your program go to enhance the implementation of science experiences? In today's webcast, Shari and Barbara have been weaving in both some review, and some new content about the as they responded to many of your questions.

Of course, they have not been able to answer every question nor have they been able to present everything you need to know about early childhood science or about being an effective young teacher of children. Only your continued professional development can help you reach those goals. In comparison with sustained professional development, these four webcasts total less than six

hours exposure to early childhood science. In contrast, an early childhood education science methods course in a two or four-year degree program would likely be more than 20 hours of classroom time.

So I am here in part to urge you to continue your professional development in this area and others where you want to see growth over time. This can be accomplished in a number of ways. Through college courses on a campus, or college courses online. Through a community of practice, or peer study groups. Or you might take advantage of mentor coaching, reflective supervision, technical assistance, or even demonstration teaching with a colleague. Today seems like a good time to also mention why we were unable to answer some of your questions during these webcasts. There was a subset of questions that were so specific to individual, local programs that we simply could not provide an answer.

Each local program needs to make key decisions for their children and families in keeping with the performance standards and other regulations. You will need to engage in the hard work that is necessary to arrive at the "right answer" for your specific situation. The answers must match the context created by your identified curriculum and the backgrounds and skill levels of your children, and in keeping with the local program plans and policies for implementing Head Start services there.

There are many ways programs pursue local answers for local questions: through your curriculum, an education advisory committee, by working with the education coordinator, child development specialists, even though the work of consultants, and in some cases, by working with local licensing representatives. Many programs have found assistance by using the publications you see now on your

screen.

After the webcast, you can download at the ECLKC these professional development resources from a link at the bottom of the screen. During each webcast, if you have not been asking yourself about the status of science experiences in your curriculum, about the effectiveness of science teaching in your program, and about the outcomes for children in your program, now is a good time to ask those questions. Now is the time to begin formulating where to go in professional development.

For that reason I want to take some a little time to highlight some very important aspects of the Head Start Act of 2007. Did you know that the act now requires that "information from the assessment of teachers be used to inform professional development plans to improve teacher effectiveness?" The act contains a great deal of helpful information related to quite specific to teacher in-service requirements. I encourage you to take time to review those requirements. Here are a few examples: each head start teacher shall attend not less than 15 clock hours of professional development per year.

The act, which is in keeping with current research, says that professional development needs to be high quality, sustained, intensive, and classroom focused in order to have a positive and lasting impact on class instruction and the teacher's performance in the classroom. The act defines “professional development” as high-quality activities to improve the knowledge and skills of Head Start teachers and other staff. The act specifies that professional development experiences are to increase teacher competencies in approximately 20 different areas.

Each Head Start agency and program is also to create, in consultation with you

the employee, a professional development plan for all full-time employees who provide direct services to children and ensure that these plans are regularly evaluated for impact. Before we go to today's final questions from you, I would like to close this segment by sharing some insight from Dr. Shirley Malcom, the Director of Education at the American Association for the Advancement of Science. About a decade ago I heard Dr. Malcolm say "science matters for children because it matters to children."

That phrase has been with me ever since. Throughout this series we have illustrated that principle and investigated how science matters to children -- in their questions, in their daily observations, in their sensory learning, and yes, even in their hypothesizing. As Barbara shared her teaching experiences within each webcast, we observed how children are by nature trying to make sense of the world.

They are demonstrating powerful, and at times, complex ways of knowing about the world. Shari and our other experts have helped us see how well designed, hands-on experiences and extended conversations in the early years prepare children for more formal science study. And all of our guests have given us many reminders that we must not set limitations, but rather, have limitless high expectations for every child, beginning in infancy.

Dr. Malcolm also describes science and math as the great equalizer and the builder of bridges to later educational and life opportunities. Will you help? Will you have high expectations for every head start child? Will you become more effective at planning and implementing curriculum experiences? Will you accurately assess each child and continue to build bridges of learning with them? Shari?

Shari Ellis: Thank you, Michele. Now it's time to answer some other questions you have emailed to us today. Here to help is dr. Jean Simpson from the Office of Head Start.

Jean Simpson: Thank you. It's not too late to send in your questions. Remember you can type your question into the "ask a question" form on your browser. Our first question is for you, Shari. And our viewer says, at our program, we have some limitations that don't permit us to visit community locations such as ponds or streams. What could we do to get more real experiences for children given these limitations?

Shari Ellis: Well, I know that that is a concern for many programs in many different localities. What I would recommend is that they look for visitors who will come to them, either nature centers, museums, science centers, park service, and bring specimens, live animals, those kinds of things to the classroom. Barbara had some great opportunities in South Dakota. Would you like to describe the zoo mobile?

Barbara Dowling: Yes. We have a zoo in our community, and they have what they call a zoo mobile. It brings different things to the classrooms. They will come to your classroom. They have different activities. They are graded for the age of your children and they are very, very interesting for them to do. We also have some mobiles that come from our state library and they talk about such concepts as light and how it works. And those also come directly to rural areas in our state and help give those children an opportunity to experience those kinds of learning things.

You can also talk to most any person, a farmer who will bring animals into your classroom. You can also talk about -- get the gardeners to come in. You can get

Game, Fish, and Parks to come in. There are just lots of ways that you can get people who are very knowledgeable about science.

Maybe even from a science center in your area or if there is an agency that works with science, they would be able to come in. Your local weatherman from the weather station on the tv, they're always happy to come and talk with the children about weather formations and things like that. Just open yourself to the possibility that your community has to offer. That's one way to do it. It's really an exciting way to do it.

Jean Simpson: Thank you, Barbara, Shari. Barbara, the next question is for you. Are there types of science experiences that can work for large groups?

Barbara Dowling: Several times you can introduce concepts into large groups. If you're outside exploring, lots of those are large group activities. You can go out and look for certain leaves. You can go out and look for lady bugs or ants or worms. Those are all large group activities. Sometimes when you work more into exploring, the small groups happen because certain children are interested in certain phenomena that you've decided to study.

But often it's nice to open it up to the large group and figure out which children would be interested in which activities. But you can always start with the large group activity and move to small as well as starting with the small group activity that catches everybody's interest in your classroom. Then it becomes a large group activity. It just works both ways and you just have to be sensitive to what the activity and the phenomena tells you to do.

Jean Simpson: Thank you. Shari, the next question is for you. You mentioned the broad concept of recycling. Could you say a little more about that and how you relate that to science? And what types of materials you use?

Shari Ellis: Well, when we think of recycling, we often think of, you know, actual recycling, like cans and plastic that we can, you know, reuse and create new things out of in many communities that have organized recycling. We actually include recycling in our study of the natural world, because becoming stewards of the earth is one of the fundamental concepts that we explore in that guide. And so we encourage classrooms and also families to recycle. But another thing you can do is just use those materials that you do recycle. Containers of all types. Cardboard boxes.

Make sure they're safe and of course clean and take away sharp edges. They can be used in your block area. They can be used as things to climb on outside. That kind of thing. I'd also like to say sometimes it's not so much recycling as maybe repurposing. So for example, the body coverings board that I showed earlier are scraps that we got from a taxidermist.

Who would know how many taxidermists there are in our country? I can tell you there's a lot. Farmers are often willing to give you emu or ostrich eggs, which we often include in our kits that we provide for teachers. If you don't happen to have an ostrich or emu farmer in your area, you buy those materials very cheaply off the internet.

Jean Simpson: Thank you. Barbara, how can we motivate teachers to approach science creatively while at the same time working towards outcomes for children?

Barbara Dowling: There are two things when you start to approach science experiments that you need in science learning. One is a sense of wonder, curiosity, and the other is to look at the possibilities that children offer.

And that the phenomena offers. Once you start looking at those two kinds of things, it just takes you everywhere. And one of the things -- if you're doing

it and really listening to the children and you're really listening to what the phenomena has to tell you, the outcomes are there.

So often sometimes as long as we have those in our head as a teacher, that we know those are the things we're doing, when we start interacting with the phenomena and the children, that's where we guide the children. That's where we take them. It's not like we have to have that written down in black and white on the board and say this is the outcome we're going to do. We're going to try to find something to fit that outcome.

We more likely fit the experiences to the outcomes that we have ingrained in our head, in our pedagogy, in what we as a teacher know we have to cover. And so we kind of look at it that way. Look at the experience. Ask yourself, what outcomes does that experience tell us about?

Jean Simpson: Ok. Thank you, Barbara. Michele, would you like to add any to Barbara's answer?

Michele Plutro: I think Barbara said it maybe quite well. I would repeat it perhaps in different words. I think when the Outcomes Framework was first issued, we had a little bit of a tremor go through the Head Start community because people felt like this was going to limit their teaching and their creativity and they would be teaching solely to those outcomes or very narrow goals and that it would be one size for all children.

I think Barbara's articulation, that yes, you need to be particularly familiar with those outcomes, and that once you have those in your head, as you arrange or rearrange your environment, as you change materials, as you interact with children, you can guide a conversation or set up an environment that children can interact that will get you to those outcomes.

Jean Simpson: Thank you. Shari, the next question is for you. Would you repeat how we can see the MESS science resources that you mentioned?

Shari Ellis: The mess science resources are going to be available on the ECLKC. I know that there are three guides that are currently Available. One is investigating water. One is insects and spiders. One is kitchen science. I have to say we've already received very positive feedback. They can be downloaded. No cost. Other than the paper and ink, of course. But ultimately, there will be 10 and they'll be coming up regularly very shortly.

Jean Simpson: Ok, thank you. Barbara, this question is for you. The joy of science sounds like quite an inspiration. And the viewer asks, how does Barbara keep her love of science so alive and refreshing?

Barbara Dowling: Well, one is just your outlook on the world. The other thing is that it's part of being an early childhood teacher. Those children come into your classroom, or if you're doing home visiting, you're responsible for those children and you're responsible to make it enjoyable for those children. The joy of learning is such a crucial thing to impart in your classroom, and once you have that as a goal and you want your children to be immersed in that, you just come away being immersed in it, because that's what we're about.

We're about making children -- giving them the disposition to be a learner. The disposition to want to learn. If we teach skills and those kinds of things without the dispositions, we lose so much. We want our children not only to know facts, but we want them to be innovative and creative and imaginative. We want them to be able to use what they learn in productive ways. Once you hold that in your mind as that's what you need to do as a classroom teacher, the joy of learning is just there. There's no other way.

[1:16:48.0]Jean Simpson: Thank you, Barbara. Shari, we've heard a lot of strategies for supporting children in scientific explorations. How can inquiry-based teaching and intentional teaching -- how do they compare and how are they different?

Shari Ellis: Well, that is a really, really thoughtful question. Inquiry science is exploring an open-ended question. Intentional teaching is planful teaching, teaching with a purpose, teaching being prepared. Inquiry science is imbedded in intentional teaching. Inquiry cannot be substituted for intentional teaching.

Yes, you have to be aware of all of these opportunities for exploration that are just going to emerge. I mean, every day you go into your classroom, there will be opportunities that you haven't planned for, but you can't assume that's going to happen.

You have to still be an intentional teacher. So what I would say is inquiry is imbedded in intentional teaching.

Jean Simpson: Thank you, Michele, Barbara, would you like to add anything?

Barbara Dowling: Shari said it very well, she really did. That you have to be intentional in your classroom. It's not a big free-for-all and let's see what happens, but you intentionally set up your environment with objects and experiences that may provoke interest in the children. You intentionally look at books that you put out in your class room you have those goals every day for your children.

Sometimes the goals may change based on something that happens in your classroom or an interest that the children will have, but You have to go into your classroom every day with a plan, with an intentionality for what's going to happen that day, but be open to the possibilities. And then the next day, you plan with intentionality for those possibilities that arose. It's not just, ok,

let's see where it goes. You have to take the children's interest. If you remember back to the sneaker story, they had an investigation. They had a question to start with.

And the question drives your intentionality, that that's where we're going to focus today. But you always need to have a question to focus on in your classroom every single day. And maybe not just one question, but maybe a few questions so that you know you have a purpose for being there.

Jean Simpson: Michele would you like to add?

Michele Plutro: I think that's right. For me the bottom line in what both of them have said and what I take away from that question is you have to be intentional all the time, even when there is a moment to appreciate, you know, a child's question, you still have to be intentional about the conversation, about your response to a child's observation. So while it is not all planned, all the interactions should be intentional.

Jean Simpson: Thank you. This is our last webcast, as you know. Is there anything else either of you would like to say?

Barbara Dowling: I would just like to challenge all of the teachers and the home visitors out there to just enjoy what they're doing. And to really hold the children in their mind as being capable and competent, that they are very intelligent, and we need to honor those gifts. And once you work from that image of a child, that they are that way, that really challenges you to bring forth the best in them and bring forth the best in your as a teacher, and that's how we move our children.

We close that gap, that achievement gap in our children when we hold them accountable and ourselves accountable for what we need to teach.

Jean Simpson: Ok. Michelle?

Michele Plutro: I would say I would like all programs to respect everyone in a program who teaches, whether that's someone who teaches and holds the hand up, guides to listen to parents, not just classroom teachers, but that programs show great respect for those who teach, and in turn that those who teach the children would have the same kind of respect that Barbara described for every child who's a learner.

Jean Simpson: Thank you. Shari?

Shari Ellis: I would like to thank the Office of Head Start for this opportunity to try to bring more science to head start children and also the opportunity to work with this wonderful team. Thank you so much.

Jean Simpson: Thank you, Shari, Barbara, and Michele. Thanks to all of you and our many experts who supported our work throughout this series. Please visit the ECLKC for additional information related to science, other curriculum support and professional development resources. Feel free to send suggestions for future webcasts to the email address at the bottom of your screen. Once again, thank you for the time you spend in making a difference.

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