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introduction

"The Young Scientist professional development materials were very, very helpful. As an instructor I knew just what to do and the teachers really enjoyed the workshops. I feel their excitement has transferred to the children. Both boys and girls are interested in and excited about their science explorations."

—EARLY CARE AND EDUCATION PROGRAM DIRECTOR

Cindy Richards, director of the West Side Early Childhood Center, found that the current trends toward standards and child outcomes caused her to question what children were really learning. Teachers were concentrating on helping children to recognize letters, rather than encouraging children to look at books or use print to communicate their own ideas. Her teachers would set up a science table, but children rarely spent time there or investigated a topic in-depth. Ms. Richards had been sending teachers to workshops for years—hoping her teachers would learn new strategies for improving early literacy, science, and math—but the effects were rarely apparent in the classroom. Ms. Richards felt the time had come to change her approach but she was unsure what she could do to improve teaching and learning in her program.

Then she was asked if her program would field-test the Young Scientist teacher guides—on water, living things, and structures—and the accompanying professional development program. Ms. Richards was reluctant at first, wondering if this was just one more gimmick, just one more shot in the dark. Flipping through the materials, she was surprised to see how extensive the program was—which was a bit daunting. But she hoped its comprehensive nature might lead to the changes she was looking for. So she said yes. She found that the hands-on exploration built teachers' understanding of the science content, inquiry process, and the Young Scientist approach to teaching. The video vignettes helped teachers connect this content approach to their own teaching practice. Ms. Richards notes, "One of the most important things I learned was the importance of time. It takes time to learn new approaches and integrate them into teaching practice. It takes time to provide teachers with the ongoing support they need to sustain successful change." As a result of participating in this professional development program, Ms. Richards sees evidence of teachers applying what they have learned. Teachers are engaging children in in-depth science explorations over time. Teachers' conversations with children don't just focus on management now (such as "Make sure to put the blocks away when you're done"), but on what children are doing and thinking (such as "How could you make the building stronger?"). For the first time, many teachers are documenting children's observations and ideas and using them to extend learning. This has been evident not only in science, but in other domains as well. Ms. Richards reflects, "Teachers see their role, their curriculum, and the children in a new way. For the first time, they are recognizing and capitalizing on the science in the everyday, which helps them to guide children's science learning more effectively. At the same time, they appreciate what children notice and wonder about, what they can do, and understand."

Others who have field-tested the Young Scientist series have had similar reactions:

"I found it really easy to follow. Everything was very clear. Anybody could use it. The teachers didn't lose interest. They really liked the hands-on parts, and they were very engaged in the reflective discussions."

—PUBLIC SCHOOL ADMINISTRATOR

"When I read through the workshops, they looked so good, I decided we needed to do them all!"

—HEAD START DIRECTOR

The Young Scientist

The above vignette suggests the excitement that can be generated when teachers really enjoy learning about and trying out new teaching approaches. In order to build the knowledge and skills teachers need to implement an inquiry-based science curriculum, the Young Scientist provides both teacher guides and a comprehensive set of training materials for each of three science explorations:

- *Discovering Nature with Young Children* invites children to assume the role of a naturalist as they observe and learn about plants and animals in the immediate outdoors, as well as in their own classrooms.
- *Exploring Water with Young Children* helps children examine the properties of water.
- *Building Structures with Young Children* engages children in investigating the relationships between building materials and design and the strength and stability of the structures.

DEVELOPMENT AND TESTING

The Young Scientist is a result of a four-year grant funded by the National Science Foundation. It draws on current understanding of best practice in science teaching and learning. Key to the development process has been the involvement of practitioners and experts from the field who have helped us design our approach, review draft documents, and test the curriculum and professional development materials. The final stage in this process was a national field test conducted from 2001 and 2002, in nineteen early childhood programs including Head Start, pre-K, child care centers, and private nursery schools. Program directors, education managers, and curriculum coordinators from these programs planned and implemented the training activities. Ninety teachers participated in the workshops and used the teacher's guides in their classrooms. Results revealed that some combination of the workshops and more informal support was important to help teachers apply their new learning in the classroom. Moreover, participants reported evidence of science learning in children's questions, observations, and discussions.

Overview of the Trainer's Guide

Teachers often feel insecure and inadequate about their own understanding of science concepts and do not realize how they can learn through inquiry and then use their new understanding in the classroom. These training materials focus on helping teachers begin to gain an understanding of the underlying science concepts in the *Discovering Nature with Young Children* teacher's guide and learn to use that guide to facilitate children's inquiry.

This guide includes all of the instructions, print, and video materials you will need to provide rich professional development experiences for teachers as they implement the *Discovering Nature with Young Children* teacher's guide in their classrooms. When workshops and guided discussions are combined with mentoring over time, your training program will lead to a quality science education program.

The trainer's guide has four components:

- A set of six **BASIC WORKSHOPS**: These workshops use hands-on experiences and reflective conversations to provide teachers with the following: a practical understanding of the science content and inquiry process that will inform their teaching; help in recognizing the science in children's work; and help in guiding children's explorations. These workshops also provide an overview of all sections of the teacher's guide.
- Eight **ADVANCED WORKSHOPS**: These workshops use samples of children's work and conversations to help teachers build a practical understanding of their multifaceted role as facilitators of science inquiry.
- A structure for **GUIDED DISCUSSIONS**: These discussions provide a forum for small groups of teachers to use classroom documentation to stimulate collaborative reflection on their own science teaching and plan new and more effective approaches.
- A description of a **MENTORING PROGRAM**: This section helps mentors use classroom observations and conferencing to support teachers with their individual challenges and help them assess their teaching and refine their practice.

The following sections will help you plan and implement your program:

- **PLANNING AN EFFECTIVE PROFESSIONAL DEVELOPMENT PROGRAM** (below) will help you select the appropriate components and schedule your events.
- **GETTING STARTED** (p. 6) describes a three-step process for preparing yourself for conducting the basic and advanced workshops.
- **RESOURCES** (p. 191) offers a range of tools, including descriptions of each of the instructional strategies used in the workshops, guidance and forms for evaluating teacher growth and planning guided discussions, a log of the video vignettes, and a bibliography of readings for you and for teachers.

Planning an Effective Professional Development Program

These comprehensive training materials, designed to support teacher implementation of the *Discovering Nature with Young Children* teacher guide, can be adapted to the needs of your particular program and teachers. We suggest you plan a three-stage program.

1. Help your teachers become familiar with the teacher's guide and the science concepts and inquiry process at the heart of *Discovering Nature with Young Children*.
2. Help teachers build their capacity as inquiry-based science teachers.
3. Sustain progress you have made and support teachers as they continue to refine their science teaching practice.

Implement these stages one at a time, based on your assessment of teacher's strengths and needs.

STAGE 1: LEARN TO USE THE TEACHER GUIDE

Use the six basic workshops to help teachers understand life science concepts, the inquiry process, and the teacher's guide. These workshops, which consist of one three-hour introduction and five one-and-a-half-hour sessions, provide the knowledge and experience teachers need as they begin to implement the teacher's guide. When scheduling the workshops consider several factors:

- Teachers will need the first three workshops before they begin using *Discovering Nature with Young Children*. These workshops will introduce the science concepts and the nature of science inquiry, help them prepare their environment, and provide an overview of open exploration.
- Teachers will need workshops 4 and 5 before moving on to focused exploration. These two workshops will provide a hands-on focused exploration and an overview of the purpose and teacher role in this stage of the exploration, preparing them to facilitate deeper investigations. Try not to wait more than three weeks between workshop 3 and 4. Teachers will need to understand how to deepen children's investigation and apply this in the classroom, otherwise the children will lose interest.
- Find ways to keep this focus on science teaching and learning in the foreground of your program's activity. Check in with teachers regularly to see how things are going in their classrooms. Do they have the materials they need? Are they finding enough time for exploration and science talks? Are the children engaged? Use mentoring or guided discussions to maintain the focus if there are extended periods between the workshops.
- Consider your climate. *Discovering Nature with Young Children* requires outdoor investigation of living things. In climates with cold winters, teachers should begin open exploration no later than early October so that animals and live plants can still be found outdoors. They can either continue with focused exploration indoors when it gets cold or return to the exploration in the spring when plant and animal life are accessible outdoors.

PROGRAM SAMPLE SCHEDULES

1. The teachers in the sample program were able to schedule most of their training sessions during naptime when they would otherwise be planning. They were also able to fit in a full-day session before the school year began. The director wanted to provide individual support from the beginning by scheduling two observation and conference sessions with each teacher during stage 1. The first helped teachers make the transition to focused exploration. The second supported their efforts to integrate representation and science talks into their regular routine and to use them effectively for science learning.

SCIENCE EXPLORATIONS WORKSHOP SCHEDULE

September 3

9:00 A.M.–3:00 P.M.

Workshops 1 and 2: Introduction and Getting Ready

September 12

1:30–3:00 P.M.

Workshop 3: Open Exploration

Observation and conferences will be scheduled with each classroom from September 26 through October 10.

October 3

1:30–3:00 P.M.

Workshop 4: Focused Exploration of Animals

October 10

1:30–3:00 P.M.

Workshop 5: Focused Exploration

Observation and conferences will be scheduled with each teacher from October 10 through November 7.

November 7

1:00–2:30 P.M.

Focused Exploration of Plants

- In another center there is no time during the day for workshops, but the teachers were eager to implement the program in their classrooms. The director offered pizza dinner and baby-sitting in exchange for their participation after the center closed. The director did her first observation and conference at the end of the series to help her prepare for stage 2.

HIGHLAND CHILD CARE CENTER'S SCIENCE EXPLORATIONS WORKSHOPS

Everybody Attend!!!

Pizza served at 6:30 P.M.

Workshops begin promptly at 7:00 P.M.

September 4*, 11, 18, October 9, 16, and November 13

*Note: The September 4 workshop is 6:00 to 9:00 P.M.

STAGE 2: BUILD CAPACITY AS INQUIRY-BASED SCIENCE TEACHERS

If you have completed the basic workshops, teachers should be beginning to use the guide and this approach to engaging children in the exploration of the plant and animal world. Use "Assessing Teacher Growth" (in "Resources," p. 202) to assess their practice. Work with your teachers to identify appropriate goals. "Science Teacher Development Plan" ("Resources," p. 210) is a useful resource when you are considering next steps and the level of support to provide as you move on. Teachers still at the beginning stage might need some help, individually or in a small group, with the goals that best meet their needs. The chapters on mentoring and guided discussion will help you plan your work with them.

Many teachers will be ready to move onto the advanced workshops after completing the basic ones. As you plan consider the following:

- Start with the first workshop, "Creating a Culture of Inquiry About Nature," which includes an individual needs assessment that will help you better understand how teachers perceive their needs and interests.
- Plan a sequence of workshops that best reflects the needs and interests identified by them and you.
- Allow time in between workshops (at least one month) for teachers to implement the approaches presented.
- Use mentoring or guided discussions to support teachers' efforts in between the workshops.

STAGE 3: PROVIDE ONGOING SUPPORT AS TEACHERS REFINE THEIR PRACTICE

If you have not used guided discussions and mentoring before completing the basic and advanced workshops, now is the time. Regular opportunities to talk about science teaching and learning will be key to sustaining and building on the gains you have made. Guided discussions provide a vehicle for encouraging documentation and analysis of the teaching and learning going on in your program. At the same time, you will be encouraging teacher collaboration and providing a vehicle for analysis and refining science teaching. Mentoring is also an important way to help teachers progress by addressing their interests and concerns directly in relation to their classroom. Use the chapters on guided discussion and mentoring to plan this stage of your professional development program.

Getting Started

The time you spend preparing will contribute to the success of your professional development events. Here we describe the special things you can do to prepare for the workshops. Follow these steps as you get ready:

1. Become familiar with the teacher's and trainer's guides.
2. Find a location for the workshops.
3. Prepare to be an instructor.

STEP 1: BECOME FAMILIAR WITH THE TEACHER'S AND TRAINER'S GUIDES

A clear understanding of the curriculum and its science content will be essential if you are to help others understand this approach to teaching and learning. Carefully read the teacher's guide, familiarizing yourself with its approach and structure. Consider what aspects of this approach will be familiar to teachers and which ones will be new. Identify the parts of the guide that will be particularly helpful to teachers. Reading the guide more than once will help you build your own understanding of this teaching method and the various ways the guide supports teacher adoption.

Next, familiarize yourself with these professional development materials. Quickly reading the whole package will give you the big picture—an overview of the structure and content of the instructions and the supporting materials. In a more focused read, examine each aspect of the instructional approach and anticipate how teachers might respond.

STEP 2: FIND A LOCATION FOR THE WORKSHOPS

Select sites for your workshops that will be comfortable for indoor work and that offer a rich variety of plants and animals outdoors. If you need to create a compost heap that will encourage new animal life, do this at least two weeks in advance. See the “Essential Information” section of the teacher’s guide (p. 121) for instructions.

Round or rectangular tables will provide a good surface for the indoor explorations in the basic workshops. Easy availability of an overhead projector, screen, VCR, and monitor will make your work easier.

STEP 3: PREPARE TO BE AN INSTRUCTOR

Familiarity with both content and process of the workshops will give you confidence as a presenter. Take the time to complete these tasks.

- Engage in an outdoor exploration using the guidance in basic workshop 1 and in the “Getting Ready” section of the teacher’s guide (p. 13). In addition, do the indoor explorations that are described in basic workshops 4 and 6.
- Think through the discussion questions, answering them for yourself. Try to anticipate how teachers will react and then imagine your responses.
- Preview the video vignettes that you will be showing. As you watch, think about the purpose of the vignettes, children’s engagement with science, the science teaching strategies they illustrate, and what you want teachers to gain from the viewing and conversation.
- Collect the materials. You will need a variety of materials to facilitate the explorations. Plants, mealworms, and hand lenses are just a few. Review this list early (see the section on advance preparation for each workshop) and make plans for how you will get all of these things before the day of the workshop. Suggestions for finding many of these items can be found in the “Resources” section in the teacher’s guide (p. 129).
- Prepare the handouts and overheads. For the most part, you will refer participants to resources in the teacher’s guide, but there are a few handouts in the professional development package that provide guidance for small group work or observation of videos. These handouts appear at the end of the instructions for each workshop. Each participant will need a copy of each handout. The final handout is an evaluation that all participants should complete at the end of the basic or advanced workshops. The overheads, found at the end of both workshop sections, give the content a visual aid. You will need to copy them onto transparencies.
- Consider how you want to handle the “Read and Reflect” pre-assignments, which have been included for each of the basic workshops. You will need to copy and distribute them to teachers at least a week before each session. These assignments include readings in the teacher’s guide and reflection questions. Completing the assignments will ensure that teachers are familiar with the content of each session and ready to participate fully in the discussions. You will probably want to collect teachers’ responses and review their reflections to gain insight into teachers’ understandings. This will help you tailor sessions to meet the needs of individual teachers.
- Review key instructional strategies in the resources, which will help you effectively use the various teaching strategies in these workshops.

BASIC WORKSHOP 3

Overview of Open Exploration

AT A GLANCE

Purpose:

- Become familiar with open exploration, its purpose, and the cycle of activity
- Gain basic understanding of the teacher's role during open exploration
- Begin to understand how children might engage in open exploration
- Discuss needs of own environment and plan for adaptations

Activity	Time: 1.5 hours	Materials
Overview of Open Exploration Introduce the purpose and flow of open exploration and help teachers connect this information to their exploration from workshop 1. Use vignette to illustrate child engagement and the teacher's role.	1 hour	<ul style="list-style-type: none">• Overhead projector, screen, and overheads 3.1 and 3.2• VCR, monitor, and video cued to vignette 2• Copies of the vignette observation form and transcript to video vignette 2
Preparing Your Own Environment Support teachers as they discuss their assessment of their own classroom environments, available tools, and use of time.	30 minutes	<ul style="list-style-type: none">• Copies of "Read and Reflect 4"

Pre-assignment: Read "Open Exploration," "Observation and Assessment," and "Involving Families" in the teacher's guide and complete reflection questions.

Basic Workshop 3: Overview of Open Exploration

OBJECTIVES

- Become familiar with open exploration, its purpose, and the cycle of activity
- Gain basic understanding of the teacher's role during open exploration
- Begin to understand how children might engage in open exploration
- Assess needs of own environment and plan for adaptations

OVERVIEW

- Overview of open exploration (45 minutes)
- Preparing your own environment (45 minutes)

INSTRUCTOR PREPARATION

- **PREVIEW VIGNETTE 2** and identify the points you want to make during the discussion. Refer to the following video instructions.
- **REMIND TEACHERS TO BRING THEIR "CLASSROOM ENVIRONMENT CHECKLISTS."**

MATERIALS

- Overhead projector, screen, and overheads 3.1 and 3.2
- VCR, monitor, and video cued to vignette 2
- Copies of vignette observation form, the transcript to video vignette 2, and "Read and Reflect 4"

Activity

OVERVIEW OF OPEN EXPLORATION (45 MINUTES)

PURPOSE: As teachers prepare to use open exploration, they will need to think about three aspects of the curriculum:

- The sequence of steps and types of experiences children will have
- The role of the teacher as a facilitator of science inquiry
- Young children's early engagement with the natural world

The presented material will become more meaningful to teachers when it is connected to their exploration, the teacher's guide, and the vignette.

1. **PROVIDE AN OVERVIEW OF OPEN EXPLORATION** (30 minutes) using overheads 3.1 and 3.2. Discuss the purpose of open exploration using overhead 3.1. Mention that teachers have engaged in an open exploration in workshop 1, making some connection to their experience as you talk.

OVERHEAD 3.1: PURPOSE OF OPEN EXPLORATION

- **Give children opportunities to wonder, notice, and explore.**
Wondering, noticing, and exploring mark children's entry into inquiry. Using outdoor environment and finding and observing plants and animals in their native habitats are key to open exploration. Share questions and early theories to draw out initial observations.
- **Give children the support, materials, and time they need to begin their exploration.**
Learning to use the tools and assuming the role of a naturalist are important aspects of open exploration. This takes time both indoors and outdoors, learning to use the important tools (hand lenses, penlights, guide books, paper, clip boards, and pens) with teacher guidance.

Ask teachers for examples of these purposes from the teacher's guide, as per the reading assignment. You might also ask what they noticed about the instructions and which features they will find especially helpful as they use the teacher's guide. Ask teachers to be specific, citing page numbers for easy reference.

This conversation is designed to help your teachers learn to navigate through the teacher's guide. The ideas of those who have taken a careful look will help those who are feeling overwhelmed. Look for answers such as these:

Introduce the children to living things:

- In step 1 children share previous experiences, look at a houseplant or bug as they talk about the term *naturalist*, go outdoors looking for plants and animals, and talk about what they saw.
- In step 2 the children continue to look at plants and animals and talk about them indoors.
- Indoor and outdoor experiences continue in steps 3–5.

Introduce the naturalist's role and tools:

- The role is introduced in step 1 during the conversation at the beginning.
- The tools are introduced in step 3.

Help children learn to use indoor and outdoor environments:

- This happens in all of the steps. Help teachers focus on the kinds of support they can provide.
- Connect the new experiences to related experiences the children have had previously.
- Establish "naturalist" rules.
- Use focusing questions as children explore.
- Document experiences and make panels for use with children.
- Encourage descriptions of what children are observing.
- Enhance observations with tools that children can use.

Children begin to engage in inquiry:

- In step 1 the children will notice plants and animals. They will describe their characteristics and locations. The teacher records the data collected and facilitates a group discussion of the items found.
- These aspects of inquiry are repeated in step 2.
- Inquiry is enriched with the use of tools in step 3.

- a. Present the flow of open exploration using overhead 3.2.

OVERHEAD 3.2: FLOW OF OPEN EXPLORATION

- **Step 1: Introduce children to discovering nature**
Introduce the role of the naturalist with a brief conversation with the whole group. Do a thirty-minute outdoor exploration and a ten-minute science talk.
- **Step 2: Introduce children to observing living things in an indoor terrarium**
Again meet with the whole group and briefly introduce the terrarium (five to ten minutes). Follow this with small group observation time, four or five days a week. Place the terrarium on a table where a group of children can observe from each side. Facilitate a science talk after each observation.
- **Step 3: Teach children how to use hand lenses, penlights, and trowels**
Introduce hand lenses and penlights in small groups, and give children a chance to use them as they continue to observe the terrarium or outdoors. Continue the introduction until all children have participated.
- **Step 4: Continue to explore and reflect**
Repeat explorations regularly for about two weeks, giving children additional opportunities to observe indoors and outdoors. Conduct science talks after each outdoor exploration.

Make these points as you talk about open exploration:

- The guide provides detailed instructions that teachers can follow for each step.
- All children will need a period of open exploration to become familiar with the tools and the organisms.
- The children will move in and out of open exploration as they are introduced to new tools or organisms. For example, if a new animal is introduced they will openly explore before focusing on particular aspects.
- Open exploration will vary depending on the children's prior experiences and their developmental levels. Have they explored nature in preschool or at home? If so, they will need less time in open exploration—some children may take a week or two; others may take most of the exploration.

- b. Emphasize the importance of sending home the family letter in the involving families section. Also, mention the assessment and observation section. Note the value of copying the observation record and using it regularly during the exploration.

- 2. INTRODUCE VIGNETTE 2** (30 minutes). Explain that this vignette, which was filmed in a Boston Head Start, shows a small group of three- and four-year-old children exploring living things in a park. They are engaged in open exploration. The children are learning to look for animals outdoors.
- a. Distribute the transcript and the vignette observation form, and tell teachers they will use this form to take notes as they view the video, noting children's engagement and the strategies the teacher uses to encourage engagement and inquiry.
 - b. Show the vignette.
 - c. After the viewing, discuss observations connecting what teachers have seen to overhead 3.2: Flow of Open Exploration. Ask the following questions:

- What did you notice about the children's engagement?
- Which of the science concepts were being explored here?
- What aspects of the inquiry process were being experienced?
- What role did the teacher play?
- What connections can you make to the steps in open exploration?

Look for responses like these:

- Child engagement—The children are clearly excited about looking for and finding living things. They are moving quickly, trying varied locations, and moving on when they find something. Their interest is in variety more than looking closely at any of the animals they find.
- Relationship to science content and inquiry—The teacher is interjecting questions and comments that call attention to science concepts. For example, “Maybe you can find some animals that eat berries” (needs of living things); “Where did you find the spider?” (habitat); “I wonder if there is a caterpillar up there since there's a hole on the leaf” (habitat, needs); and “What do you think is going on in the hole, Jasmine?” (characteristics of living things). She encourages inquiry (“Where did you find your worm, Jasmine?”), records children's data, facilitates their reflection back in the classroom, helps them observe closely by putting the worm on paper, models wonder (“Wow! I wonder where he came from?”).
- The teacher's role—The teacher is playing a key role in guiding this exploration. To begin, she has found a safe place for the children to explore outdoors. Her comments and questions maintain a focus on the task of finding animals, suggest important science ideas (where animals come from is important information), and encourage inquiry. She is teaching them about the work of naturalists by commenting on handling the animals gently. She is collecting the data by writing down what they find and where. This not only provides an important record for their later conversations, but it models the important literacy work that naturalists do.
- Connections to steps in *Discovering Nature with Young Children*—This is step 1, the outdoor exploration, and group sharing.

Leading group science talks is one of the hardest teacher roles. Large group talks challenge teachers to engage all of the children at the same time. Small groups are easier to manage. The challenge always is developing strategies for going deeper with the science. The teacher's guide provides guidance and has some suggestions for issues that may arise. You may also want to refer participants to the teaching section of resources.

PREPARING YOUR OWN ENVIRONMENT (30 MINUTES)

PURPOSE: This activity will help teachers translate these ideas about the environment into plans for their classroom. It will provide an opportunity to put together an order if tools, supplies, or resources are needed.

1. IDENTIFY STRENGTHS FROM THE “CLASSROOM ENVIRONMENT CHECKLIST”

(10 minutes). Focus on the first three sections and ask, “What do you have to help you create a rich environment for young naturalist inquiry?” Connect teachers' resources to the chart of ideas they have made with you. Find out if any of them have things they can share or sources others should know about.

2. DISCUSS ENVIRONMENTAL NEEDS (20 minutes). Discuss one category at a time as you review the needs they have identified and help them think about solutions. The box below has suggestions for addressing each category. Before solving problems, give other teachers a chance to share their strategies, asking, "Does anyone have a suggestion for . . . ?"

Use these questions, based on the checklist, to facilitate the conversation. Focus on helping teachers with their needs.

- Did any of you find challenges with your schedule?
- Did anyone have issues providing space for living things and displays?
- Do you all have the necessary tools?
- Do you have extra adults to help? Do you have ideas for recruiting them?
- How are you going to find appropriate children's books?

This is an opportunity to reinforce the value of materials and time in inquiry science. Pursue these issues with a focus on solving them rather than communicating that they are not important.

- **Time:** Children need ample time to experience the living world in a way that builds understanding. They need to make repeated visits to plants and animals for observation and observational drawing. They will spend longer periods with worms and snails when they are investigating behaviors such as movement. Perhaps some teachers can suggest useful strategies for dealing with time. Remember to talk about the need for longer periods of time for outdoor exploration. Remind them that it can happen during recess or another outdoor play time.
- **Space:** Children must be comfortable as they observe and represent the living things in the classroom. This requires a certain kind of available table space during choice time, as well as accessibility to observation tools and representation materials. It is also important to have space to display their work and other posters or pictures at the children's eye level that will pique their interest. Allow teachers to share strategies here. Teachers are often dealing with space constraints and some may have developed unique approaches that work for them. Sometimes it is necessary to rearrange the room for a period of time to accommodate a special focus. Help teachers think about how to find the table space that they will need to put the terrarium and plants on during choice time. Remind them that the room can always be put back together when the exploration of nature is done.
- **Tools:** Tools increase children's ability to observe the natural world and represent their ideas about it. Note that resources for purchasing tools are listed in the teacher's guide on p. 129. Most of these are inexpensive, but do need to be of good quality.
- **Adults:** Although not absolutely necessary, extra adults are a big help, especially outdoors. A letter to families (p. 131 in the teacher's guide) can often generate support and volunteers. Sometimes, however, volunteers are unavailable. Suggest teachers ask their administrator to help find an interested civic group, such as a local Audubon Society chapter or Chamber of Commerce.
- **Books:** Hopefully everyone uses the library. If not, help them locate the nearest branch. There may be other ideas for naturalist books, like a local Audubon sanctuary with a library. Be sure that books are shared. Briefly mention the importance of books and point out that an annotated list of recommended books is included on p. 130 of the teacher's guide.

3. CONCLUDE THE WORKSHOP by collecting "Read and Reflect 3." Give them "Read and Reflect 4," review your expectations, and confirm the time and place for the next workshop.

VIGNETTE OBSERVATION FORM

Note your observations by identifying the teacher strategies and child responses in separate columns.

Child Behavior/Comments	Teacher Response

TRANSCRIPT OF VIDEO VIGNETTE 2: OUTDOOR OPEN EXPLORATION

Scene 1: Five children and their teacher (also named Karen) are outdoors looking for small animals. The scene opens as they are bent down, gathered around a tree.

The children: Karen, Kevin, Jasmine, Dione, and William

Child: Look at this!

Teacher: Did you find any more animals? *(Karen holds out something in her hand.)* Oh, you found a berry. *(Kevin holds out another berry.)* That is some kind of a berry. Maybe some animals eat these. Maybe you can find some animals that might eat the berries.

Child: You know what? Squirrels, squirrels eat some leaves in the trees.

Teacher: Let's see if we can find some squirrels. Where would we find them, the squirrels?

(Dione points to a leaf on the tree.)

Dione: *(Inaudible)* caterpillar did that.

Teacher: You see a hole on a leaf. You think a caterpillar did that?

(Dione pulls leaf down and examines leaf closely.)

Teacher: I wonder if there is a caterpillar up there since there's a hole on the leaf.

Child: I can't reach up there.

(Children go to another spot on the grass.)

Teachers: Did you find an animal?

Karen: *(Cupping hands)* A spider.

Teacher: Where did you find the spider?

Jasmine: Over here.

Teacher: Show me.

(Jasmine puts the spider on her arm.)

Teacher: In the grass or in the dirt. Put it down on the paper. *(Jasmine puts it on paper.)* What kind of animal is this?

Dione: An ant.

Teacher: An ant.

William: *(Inaudible)* and I scratch all around.

Teacher: So we found another ant—in the dirt and the grass.

(Scene changes to Jasmine digging a hole in the grass and children near the concrete slab with bench. A child finds something on the concrete.)

Child: I found another ant.

Kevin: Karen, come and see. We found some red ants.

William: We found some red ants.

(Children gather around talking excitedly, but hard to understand. The teacher joins them.)

Teacher: What did you find? Little red animals?

(Children talk all together excitedly.)

Child: Down in the ground.

(A girl comes over with something in her hand.)

Child: *(Yelling)* A worm, a worm!

Teacher: Where did you find your worm, Jasmine?

Jasmine: In the big hole.

Teacher: In the big hole? In the dirt?

(Jasmine puts worm on teacher's clipboard as she is writing.)

(Children dig another hole.)

Teacher: What do you think you are going to find in that hole, Jasmine?

(Jasmine continues to dig hole with her hands.)

(Lots of yelling in background from other children.)

Child: Come here.

Child: Look!

(Children gather.)

Teacher: Stay still, William. He's not going to hurt you. He's green. Now, where did you find this bug?

Child: On his shirt.

Teacher: Don't pull him—you're going to hurt him. See it on your shirt, William? If you look closely. We want to be very careful because it's so little, we don't want to squoosh him. We want to be very gentle. Can we get him on the pen or is he going to fly away? Does he have wings? There he is.

(Teacher gets bug onto the pen.)

Teacher: Sit down and I'll show you. Sit down over here so everybody can see. What kind of an animal do you think this is?

(Children gather around the teacher.)

Karen: Can I put him in my hand?

Teacher: Do you want to try to put him in your hands?

(Karen cups the bug in her hands.)

Teacher: Where did you find him, William?

William: He flew on my shirt.

Teacher: He flew on your shirt. Wow! I wonder where he came from.

TRANSCRIPT TO VIDEO VIGNETTE 2: OUTDOOR OPEN EXPLORATION (CONT'D)

Scene 2: In the classroom, the same children are sitting around a table with their teacher.

Teacher: Kevin, what about you? What else did you find?

Kevin: I found a spider (*inaudible*).

Teacher: Yes, you did find a spider. Where did you find the spider? (*Teacher shows her clipboard to Kevin.*) See, I have it on my chart all the things that we found when we went outside. I wrote it down.

Kevin: I found my spider in the grass.

Teacher: What about you, Karen? What did you find at the playground? What kind of animal did you see?

Karen: I found an ant and I found more ants . . . and more.

Teacher: So you found a lot of ants. Where did you find your ants?

Karen: I found them in the grass.

Teacher: You were moving the grass around and you saw them in the grass? And where else?

Karen: Then they were going to the house. They were sleeping because they want to sleep and then they tired and the house [is] going to be dark.

Teacher: What do you think the ants eat? How can we keep them alive?

Karen: Because we don't want to keep them out of the home.

Teacher: Okay. So, we need to let them in their home to keep them alive. And what are they going to eat? What do ants eat?

Child: Grass.

Teacher: Grass, maybe.

Karen: Because ants eat sand. Because (*inaudible*) outside

Teacher: Okay, Dione, what did you find? What kind of animals did you find?

Dione: Spiders.

Teacher: Spiders. What else?