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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

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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 in 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 *Building Structures 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 your teachers as they implement the *Building Structures 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 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. 193) 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 for you and for teachers.

## Planning an Effective Professional Development Program

These comprehensive training materials, designed to support teacher implementation of the *Building Structures 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 teachers become familiar with the teacher's guide and the science concepts and inquiry process at the heart of *Building Structures 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 teachers' strengths and needs.

## STAGE 1: LEARN TO USE THE TEACHER'S GUIDE

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Use the six basic workshops to help teachers understand the building structures 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 *Building Structures 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.

### PROGRAM SAMPLE SCHEDULES

1. The teachers in this 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 conferencing 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 Towers

### 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.

Workshop 6: Focused Exploration of Enclosures

- 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 babysitting 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 6:00–9:00 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 building structures. Use "Assessing Teacher Growth" (in "Resources," p. 204) to assess their practice. Work with teachers to identify appropriate goals. "Science Teacher Development Plan" ("Resources," p. 212) is a useful resource when you are considering next steps and the level of support to provide. 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 Building Structures," which includes an individual needs assessment that will help you better understand how the 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

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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

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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

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Select sites for your workshops that will be comfortable and provide good table or floor surfaces for building structures.

Round or rectangular tables will provide a good surface for the building activities 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

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

- Explore the building materials using the guidance in basic workshop 1 and in the “Getting Ready” section of the teacher’s guide (p. 13). In addition, do the hands-on activities 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 building materials to facilitate the explorations. Look for varied shapes, textures, and weights. 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. 79).
- 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 participants a visual aid to the content. You will need to copy them onto transparencies.
- Consider how you want to handle the “Read and Reflect” preassignments, 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.