Early Learning Standards in Action

Young Children Exploring Motion

Elizabeth A. Sherwood and Amy Freshwater

Guidelines for developmentally appropriate practice and related early childhood program standards have long been used to shape teaching practices and promote excellence in early childhood education (NAEYC 1984, 1996, 2005; Bredekamp & Copple 1997). These guidelines emphasized the need to provide environments that support all domains of learning and development. Today program standards support educators in designing effective programs for young children.

Today's rapidly expanding and increasingly academic world of education for three- and four-year-old children has led to expectations of accountability for children's achievements and the creation of early learning standards. At least 41 states and the federal Head Start program have early learning standards (Scott-Little, Kagan, & Frelow 2005) specifying anticipated outcomes that teachers are responsible for helping children achieve. This article describes how teacher educators and classroom teachers used engaging, developmentally appropriate experiences to ensure that children had numerous opportunities to meet early learning standards. We also suggest strategies to document the learning that takes place as children eagerly explore their world.

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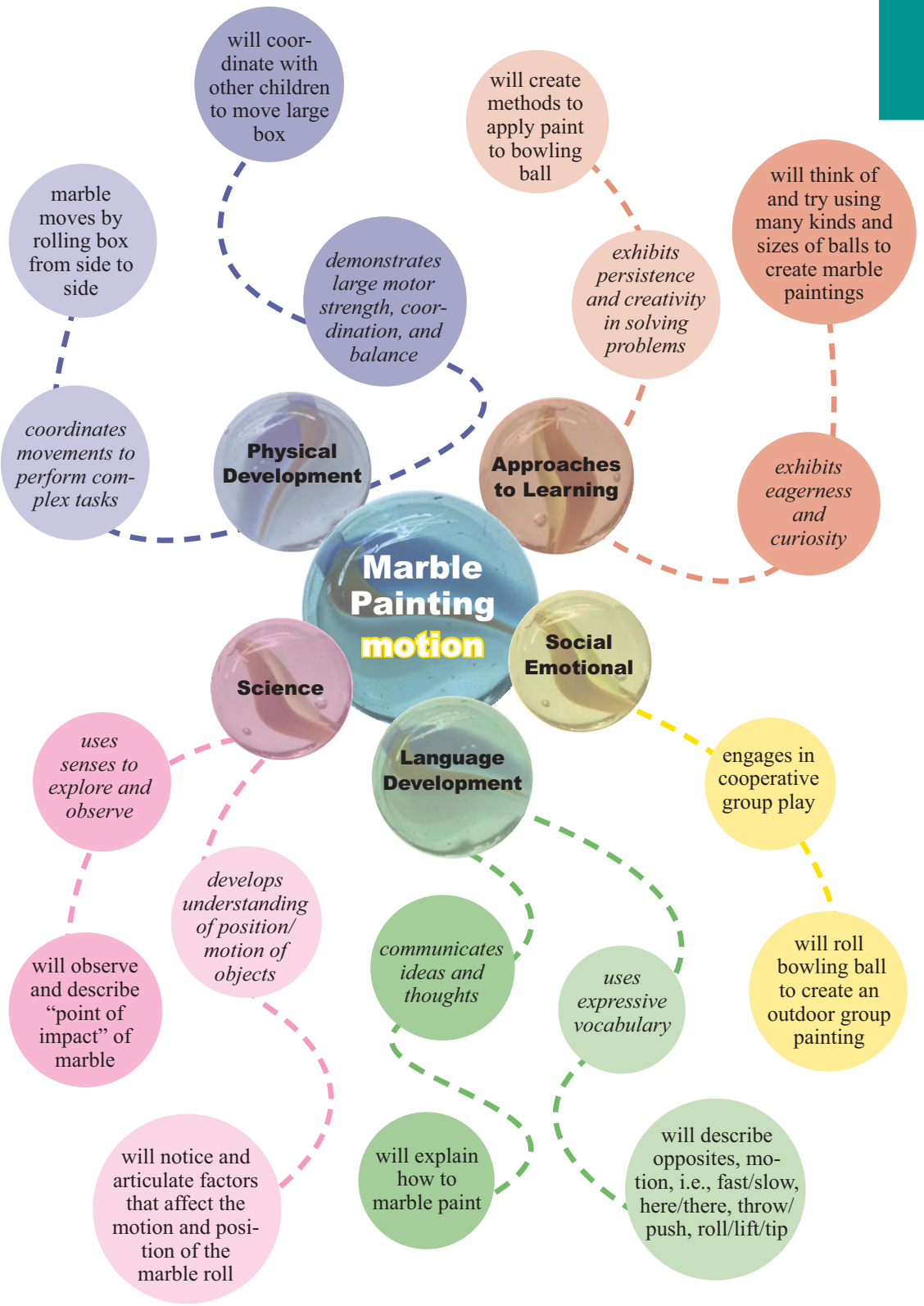
Getting started: Early planning

A key science learning standard for young children is to understand and apply the skills of scientific inquiry (National Research Council 1996). Another is to develop an understanding of "the position and motion of objects" (National Research Council 1996, 127). As teacher educators, the authors wondered, Can teachers use science standards to support learning and assessment in an early childhood classroom in ways that are developmentally appropriate, meaningful, and fun? Can children achieve benchmarks (descriptions of skills, knowledge, and performance appropriate for children ages three to five) related to these standards, explore several science concepts, and document their learning? To answer these questions, we decided to explore applying the standards with a familiar activity—marble painting.

Additional goals for children included learning to use real materials in active ways, asking and answering questions, figuring things out (using scientific inquiry), and solving problems about position and motion.



Marble Painting Planning Web

(Benchmarks are in *italics*)

Finally, we wanted to hear children talk about their discoveries and show us what they understood.

After reviewing the state's early learning standards to consider what the children might learn from marble painting activities, not just in science, but in other areas as well, we created a planning web (see "Marble Painting Planning Web," p. 2) to expand and enrich the marble painting experience (see Worsley, Beneke, & Helm 2003). We anticipated ideas the children might have as well as activities we thought might be interesting to pursue. What might children do with a bowling ball? How could they make marble painting bigger or smaller? What vocabulary is relevant to this activity?

This intentional planning allowed us to clearly identify the standards to address and determine how they connected with goals for individual children. The steps taken in intentional planning allow teachers to include standards in written plans, assess and document individual children's skill development and content learning, and provide specific examples to share with families (Gronlund 2006; Scott-Little, Kagan, & Frelow 2006) (see "It's the Process: Intentional Planning and Documenting with Early Learning Standards," p. 4). We partnered with a teacher in a preschool classroom in an accredited center to try out our ideas.

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What the children already knew

The preschoolers were so familiar with marble painting that, when asked how to do it, several children were ready to show what they knew. Four-year-old Karli provided clear directions. She picked up a paint-spattered box lid and said, "Put in a piece of paper. Put in a marble from the paint and roll it around. You have to hold the box and tip it." She knew the steps in the process and the position and motion of objects, and she had a simple understanding of the physics concepts of gravity and force. Teon, age three, also understood the marble painting process, saying, "It rolls. It gets paint on. It makes little lines where the ball goes."

Katz says that "for conversation to occur, *there must be something to talk about!* Something that matters to the talkers; something of interest and significance to them. There cannot be real conversation without content" (2003, 12). Marble painting provided the meaningful content. Teon observed marbles rolling. He understood that the lines of paint showed where the marbles had traveled and could communicate his observations to an interested listener.

It's the Process: Intentional Planning and Documenting with Early Learning Standards

Steps	Examples from marble painting activity
Assessment: Review each child's interests, capabilities, learning styles, and prior experiences.	We knew the children and were familiar with their individual skills and interests.
Develop an idea: Brainstorm ideas and choose an appropriate activity based on your goals for the children and their interests.	The children loved marble painting. (In fact, just about any activity involving paint was a favorite with this group!)
Identify relevant standards and benchmarks: Think about goals for children's learning and the standards that can be addressed with this activity.	We wanted to look at science standards, open-ended thinking, and approaches to learning with the children.
Predict possible outcomes: Using knowledge of individual children, think through their possible reactions to the activity: Will some need more teacher support than others? What kind of teacher prompting, questions, and comments will individual children need? What ideas might you or the children have, and how will these relate to the standard(s)?	We created a planning web to expand on the simple activity of marble painting, and we predicted children's responses to our ideas. For example, we expected Karli to be articulate and eager to explore her own ideas. We thought Teon would show us what he knew through gestures, and we thought his explanation of what happened when we changed the activity would be simply expressed. We knew we would need to stay close to Teon and scaffold his developing language skills.
Think of open-ended questions: Brainstorm questions and write them on a file card to keep close when working with children. Write down more questions as you think of them.	Our questions included, "How could we make bigger lines?"
Implement the activity: Stay close to children and provide support with open-ended questions, comments, and interested listening.	We stayed close to Teon (and others) to ask questions and support learning. We encouraged children to try their ideas and talk about their observations.
Document children's responses: Note children's individual responses to the activity, their processes, and their questions. Note the skills and knowledge they demonstrate.	We took quick notes about what children said, and we created and recorded more questions for them as we talked and rolled marbles and balls. We noted that Teon continued to gesture about rolling the balls on the playground. We remembered "wait time"—giving children ample time to respond to questions and to share their own ideas.
Update developmental portfolios: Use notes about children's reactions, questions, and comments and your own reflections to guide responsive planning for the next inquiry event.	We noted each child's responses and enthusiasm for exploring marbles and balls and put notes in their developmental files. The notes will be used for family conferences and assessments.
Reflect on and evaluate the activity: What did the children show you they learned when they responded to the activity?	We noted that the children used creative language ("paint splash") and that they thought carefully and solved problems (for example, putting paint on bowling balls with paint brushes instead of trying to roll the paint on) while they worked. We kept the activity open ended by allowing the children to try out their ideas about how to change the activity in interesting ways ("We could throw the balls" "We could get a bigger box").
Review and plan again: What will you plan that will support what the children have learned and will take their experience further?	We planned our next inquiry event. We will roll balls down a set of stairs and a ramp and ask the children to predict what will happen when they release the balls at the top of the stairs or a ramp. The children will draw pictures of what happens and will develop questions about which balls roll faster and why.We anticipate discussing rolling versus bouncing and helping children develop their own definitions of the terms.

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Talking with children as they paint with marbles helps them mentally process information and articulate what they are learning. Sitting with children, examining their paintings, and asking them questions supports exploration and learning. For example, Stephanie, the classroom teacher, looked at a child's work and said, "Hmm, the blue line is going along straight to the corner of the paper, then it turns and goes to this side. I wonder how that happened?" In response, Teon gestured with his hands to indicate moving the box. Another child said, "You have to move the box every way." The teacher summarized: "Oh, so when you move the box up on this side, the marble will roll . . . ?" "Down," the children chorused. Both children understood the cause-effect relationship between moving the box and moving the marble. They also knew how to control which direction the marble moved.

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Building communication skills

While speaking with the children about their paintings, we were struck by the importance of communication in supporting scientific learning. In fact, communication is one of the basic science process skills. By asking only a few questions at a time and allowing time for children to think about them, we communicate to children that we are truly interested in their responses.

It's important for children to express their ideas in their own ways. For example, Karli chose to talk about her ideas, but Teon, at age three, used a few words and gestures to show what he knew. Sometimes Teon said "I'll show you" and did so without additional words. Teachers can support learning for a child like Teon by describing his experiences out loud, modeling relevant vocabulary. Whether their communications are nonverbal or detailed and vocabulary rich, young scientists need teachers to listen patiently to them articulate what they see and know. By asking for clarification, showing genuine interest in and acceptance of what children have to say, and encouraging the use of more precise language, teachers can change marble painting from a simple art activity to a science exploration (Owens 1999; French 2004).

Asking open-ended questions allows children to reflect and speak about science (see "Idea Starters: Asking Open-Ended Questions," p. 6). Hendrick notes that "open-ended questions foster the production of original, divergent ideas and solutions . . . the questioner doesn't know what the answer will turn out to be" (2001, 483–84). Open-ended discussion fosters more complex thinking in children. If teachers wait for children to respond, children

Idea Starters: Asking Open-Ended Questions

Closed questions (questions with one right answer):

How much is two plus two?

What color is this?

Which one do you like?

Teachers can tell immediately when they've asked closed questions, because children respond with yes, no, or a single-word answer.

Open-ended questions (questions with many right answers):

I wonder . . .

Why do you think?

Describe what you see.

What does it look like to you?

How does that happen?

Why did it work that way?

What about this part?

How can you tell?

How is this different?

Teachers need to practice asking open-ended questions throughout the day!

Ideas for using open-ended questions

- When planning activities, think of open-ended questions that support learning. Write the questions on a file card.
- Keep the file card handy as a reminder about what to ask children when they participate in the activity.
- Plan open-ended questions related to different centers in the classroom, write the questions on file cards, and post them in the learning centers as reminders of questions to ask children while they play.
- Take file cards to the playground. Stay close to children's play and ask open-ended questions outside.

often can express their thoughts more completely and in more detailed and precise language (Rowe 1987).

To plan the open-ended questions we wanted to ask, we had to understand each child's developmental levels and interests. In thinking about divergent questions and possible child learning outcomes and experiences, we became more open-ended thinkers, more creative in our ideas for teaching.

When asking open-ended questions it is essential to accept children's answers.

When asking open-ended questions it is essential to accept children's answers. Teachers let children know their ideas are valued by showing respect for their responses and comments about an inquiry event—a classroom activity to promote exploration of a topic (Owens 1999). Teachers should write down children's comments, whether or not their perspectives are consistent with those of adults. This documentation of a child's comments and current level of understanding can be useful in later developmental assessments. The information can also guide teachers in providing additional experiences to enhance children's knowledge and skills.

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Expanding explorations

Expanding on planned activities in response to children's interests and questions is an important aspect of developmentally appropriate practice. For several days the children had many opportunities to marble paint. To expand their thinking, we asked, "How could we make bigger lines?" The children took a few moments to think and then responded enthusiastically, "We need bigger balls!" This suggestion prompted a Ball Hunt. We searched the classroom and playground and found golf balls, ping pong balls, a Wiffle ball, a tennis ball, and a plastic ball with a chime inside it. As we observed the children painting using various sizes of balls, we heard and recorded their comments: "Ooh, fuzzy," "Look, dots," "Mine has lots of lines. It's all over lines 'cause it gots lots of balls in it," and "When it tips, they all go down." Clearly, the children were actively engaged in inquiry and observation of details.

The children had noticed that dropping a paint-covered marble from a spoon onto a piece of paper created a paint spot that marked the point of impact where the marble hit the paper. When we asked, "How can we tell where Karli first dropped the blue paint golf ball?" Aisha responded, "See the splash. There's a splash right there!" Teon replied, "Mine made the most big splash." We recorded the children's language as they described their ideas, noted their creative descriptions of the point of impact, and used these observations to guide us in extending the children's discoveries. How

could we use the children's interest in "splash marks" to encourage additional exploration?

"How could we make different kinds of splashes?" was the next question we asked the children. Our initial experiences with marbles led to experimenting with dropping different size balls and objects of other shapes. The children then tried varying the height from which a paint-covered object was dropped, first by standing on a chair, then from the climber outside. When the children suggested throwing things, we hung a sheet against a wall and let them experiment with that. These experiences supported the children's progress toward addressing standards related to scientific inquiry, problem-solving, motor skills, and curiosity.

The children examined the different balls and tried using several at one time in their paintings. They used their senses to observe the results of their explorations, which is a basic science skill. For example, they talked about the different sounds the balls made as they hit the surface, making sounds themselves like *sploosh* and *bonk*. They were beginning to understand that changing the direction of a force (tipping the box up) not only resulted in a change in the direction of the balls, but also affected how fast the balls rolled, key concepts in physical science. They understood that balls with different textures produced different effects with paint, and they tried to describe what they saw, saying things like "Look at all the dots" about a Wiffle ball and "It makes bigger lines" about a tennis ball.

When asked "How can we make the balls go farther?" the children responded, "We could throw the balls" and "We could get a great big, big, box." We tried using a very large box.

Additional questions invited the children to explore further:

- What if we used the large playground balls as our "marbles"?
- What if we increased the weight of the "marbles" by putting paint on bowling balls and rolling them around on a sidewalk?
- What if we put paint-covered balls on paper inside a plastic wading pool?
- How can we get the marbles/balls to move without a box to tip?

In addition to supporting science learning, presenting children with questions such as these and asking for solutions shows respect for their ideas, enhances their self-esteem, and addresses social and emotional benchmarks such as cooperating with other children to solve problems (Marion 2003).

Marble rolling moved outside where a sidewalk served as the paint surface. The developmentally appropriate activities created in response to the

children's interests required their cooperative efforts. For example, two girls tried unsuccessfully to cover a bowling ball in paint the same way they had the marbles. Suddenly, one girl said, "Paint brushes!" Soon the girls had the ball completely covered in paint and ready to roll across the sidewalk "to make more lines." Another group made a giant painting with plastic-covered playground balls. They quickly became aware of the power of wind, shouting, "The wind—it's blowing the paper. Look! Our ball! The wind's blowing it to me!" It took the cooperation of the entire group to move the balls across the large area and to keep the paper from blowing away. When the painting was complete, teachers and children worked together to get it safely inside, despite the gusty winds.

Working with Standards: Challenge Yourself

We've described how thinking about and planning with standards enriched the children's work with marble painting. What about you? What ideas do you have about favorite activities and how to use them to support early learning standards?

If you are new to working with early learning standards, begin with a simple, enjoyable activity. The possibilities are endless! Try out intentional planning with

Ramps—playing with cars and other things that roll in the block area; exploring outdoor slides.

Water play—finding the best squirters; how are other liquids different from water?

Making play dough—comparing different recipes, allowing children to create their own recipes ("Can you make play dough without water?").

After choosing an activity, look at the early learning standards for your state and the related benchmarks. Which ones can be addressed by the activity? Write your thoughts and note how the children could meet the standards through their learning experiences.

Practice communicating your assessment of individual children's learning. For example, based on information in this article, what information about Teon's skill development and science content knowledge could you share with his family?

Documenting learning

Our observations indicated that the children, as a group, had done lots of things with various kinds of balls and paint. Laughter and enthusiasm were signs that they had fun, but how did we know what, if anything, individual children learned? Effective assessment gathers information from many sources about children's performance in real situations over time (NAEYC & NAECS/SDE 2003). Our sources, gathered over several weeks, included these:

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A videotape—As we played the videotape for the children, we recorded their comments as they spontaneously narrated the action. The comment "Look, the wind is making it go," as the wind moved a playground ball during outside painting, indicated achievement of the science benchmark "describes the effects of forces in nature."

Digital photographs—Some of the children arranged a group of photographs in the correct sequence and provided appropriate captions, such as "That was the first time, because there was one line" or "That was the tenth, 'cause there's lots of lines." These children effectively communicated their own observations, a science benchmark, and demonstrated an understanding of sequencing, a mathematics benchmark.

Teacher observations—The teachers recorded information on individual children's learning related to specific benchmarks. These observations included

- Karli: "grouped paintings by which ball was used—marble, Wiffle, golf" (*Mathematics—sort and classify objects*)
- Teon: "when asked, motioned with hands how to get ball from one side of box to other, then did it" (*Science—position/motion of object can be changed*)
- Aisha: "said, 'You guys, lift it high so it goes to Enrico'" (*Science—describes the effects of a change in motion*).

The teachers also made notes on other aspects of individual children's development:

- "When urged to join us with big balls, Blair and Rico sat back and looked on. Prefer nonmessy activities?"
- "Mia and Keni joined Ali in lifting sensory table with both arms. [Cooperation and motor skills]"
- "Gia and Marie decided to apply paint to bowling balls with paint brushes before they rolled them to each other. Worked better than trying to roll ball through puddle of paint. [Problem solving]"

Observations such as these help teachers refine ongoing experiences to meet the needs of all the children.

Work samples—The teachers collected samples of individual children's paintings over several weeks. Some children's paintings showed very little change, while other children's paintings became much more complex over time. Teachers also saved digital photographs of paintings with captions that documented children's description of the process used to create the works. Comments ranged from "That's mine" to detailed step-by-step explanations. These items provided a clear snapshot of the children's language and observational skills at that point in time.

Resources for Early Learning Standards and Science

To learn more about your state's standards, visit the Web site of the Early Childhood Assessment Consortium of the Council of Chief State School Board Officers: **www.ccsso.org/content/PDFs/ECstandards.pdf.** Scroll down and click on your state.

Many state child care resource and referral agencies also provide resources and professional development opportunities related to early learning standards. Head Start teachers can find the Head Start Child Outcomes Framework online:

www.headstartinfo.org/pdf/soutcomespath28ppREV.pdf

Resources on Standards from NAEYC

NAEYC & NAECS/SDE (National Association of Early Childhood Specialists in State Departments of Education). 2002. Early learning standards: Creating the conditions for success. Joint position statement. Available online: www.naeyc.org/about/positions/early_ learning_standards.asp.

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Conclusion

Our original goal for marble painting was to use it as a vehicle for helping children to understand and apply the skills of scientific inquiry and to develop an understanding of motion. The information gathered from the sources above indicates that, after the marble painting activities, most of the children had a beginning understanding of these skills and concepts. However, it quickly became apparent that the "simple" science activity had become multifaceted and addressed many benchmarks, including some related to language arts, physical development, social and emotional development, and approaches to learning. The children were actively engaged in developmentally appropriate experiences that were richly satisfying and meaningful to them. The classroom teachers, through thoughtful preparation, questioning, and detailed observation, ensured that the children were actively engaged in meeting early learning standards.

It quickly became apparent that the "simple" science activity had become multifaceted and addressed many benchmarks, including some related to language arts, physical development, social and emotional development, and approaches to learning.

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It's the Process: Intentional Planning and Documenting with Early Learning Standards

Steps	Examples
Assessment: Review each child's interests, capabilities, learning styles, and prior experiences.	
Develop an idea: Brainstorm ideas and choose an appropriate activity based on your goals for the children and their interests.	
Identify relevant standards and benchmarks: Think about goals for children's learning and the standards that can be addressed with this activity.	
Predict possible outcomes: Using knowledge of individual children, think through their possible reactions to the activity: Will some need more teacher support than others? What kind of teacher prompting, questions, and comments will individual children need? What ideas might you or the children have, and how will these relate to the standard(s)?	
Think of open-ended questions: Brainstorm questions and write them on a file card to keep close when working with children. Write down more questions as you think of them.	
Implement the activity: Stay close to children and provide support with open-ended questions, comments, and interested listening.	
Document children's responses: Note children's individual responses to the activity, their processes, and their questions. Note the skills and knowledge they demonstrate.	
Update developmental portfolios: Use notes about children's reactions, questions, and comments and your own reflections to guide responsive planning for the next inquiry event.	
Reflect on and evaluate the activity: What did the children show you they learned when they responded to the activity?	
Review and plan again: What will you plan that will support what the children have learned and will take their experience further?	