The anticipation was almost killing them; it was written all over their tiny faces. It had been a long wait for them and the children couldn’t contain their excitement and curiosity. They wanted to know what would happen today. What would they observe? How would their object change? Yesterday their teacher had told them they would be exploring how change happens. To begin their study of change, their teacher presented them with an ordinary object that most of the children knew right away. Working like scientists, they made observations using their senses and generated lots of cool words to describe their object. When the lesson ended, their teacher told them they would get to observe another one of the same objects tomorrow, but this time it would be different. In her words, it will have undergone some changes! No matter how many questions they gave her throughout the rest of the day, she would not tell them anything about what they would do in science class tomorrow. Even though they had rushed in this morning, their teacher still made them sit for a long 10 minutes before she told them it was time to work like scientists!
Curiosity is a powerful force, often driving scientists to spend an entire lifetime searching out the answer to one question. Just as scientists thrive on curiosity, so do children (AAAS 1989). Children come to preschool and kindergarten with lots of questions and although they may lack the formal methodology of seeking answers, they can learn how to think and work like a scientist given the right support and guidance by their teacher. Carefully crafted experiences in the early childhood classroom can create learning opportunities for children that allow one curiosity to lead to another. Learning how to find out answers to fascinating questions is what science is all about. In fact, it can be as simple as learning how an ordinary egg can be changed. For the past year, we have worked together to develop science lessons for kindergarten that would allow us to tap into the natural curiosity of children. Using the 5E model of instruction (Bybee et al. 2006), we developed a unit around everyday objects and experiences based on our local and state standards.

Engage With an Egg
The first lesson in the unit began by having students make observations of a simple raw egg. Before we began, we checked each child’s record to see whether anyone was allergic to eggs. We also reminded students that we do not eat or taste anything, even familiar food items, in science class. To start the lesson, we had a discussion with our young scientists to find out what they knew about eggs. Had they ever eaten an egg? Did they know where eggs came from? Next, we put the children into smaller groups and gave each group a raw egg. We told students that scientists use words to describe how objects look, feel, smell, and hear using their senses. Working together, we moved through the senses with the exception of taste and asked students to provide us with words that described the egg. To help students, we started by providing sample questions (e.g., What color is the egg? What shape is it? How does it feel?) to guide their thoughts. We recorded the student’s ideas on a graphic organizer (Figure 1) and discussed with them how scientists use their senses to collect data or information about the world around them.

Exploring Eggs
After the children made observations of their egg, we asked them if they had any questions about their egg. Boy did they have questions! Many of them wanted to know where we got our egg. They wanted to know what was inside the egg. One little one even asked what it would look and smell like if we cooked our egg! To satisfy their curiosity, we tried to answer as many of their questions by asking them “how could we find out?” For example, to help students find an answer to the question regarding what was on the inside of the egg, when we asked them how we could find out, several students told us we could crack it open. So we did! The opened egg was put into a clear plastic container so the students could see it. This gave us another opportunity to have students make observations using our senses graphic organizer. It also gave us the opportunity to compare and contrast the differences between the cracked open egg and the egg that was not cracked open. Using a T Chart and some scaffold questions, we modeled for students how they could use their observations to tell how things are the same and how things are different (Figure 2, p. 30).

Explaining Eggs
After making our comparison, we continued to discuss how words are used to describe objects and how they can change. We read An Egg Is Quiet (Aston 2006) to show students how writers use words to describe objects and how they are the same or different. Our students worked with us to write their own sentences about our egg and how an egg can change. The last part of the lesson continued to focus on how we can make eggs change (see Decalculifying Egg Shells, p. 31).

Going into the last part of the lesson, students did not know anything except they would get to make more observations of an egg that had been changed. Before we began observing our second egg, we had students put on goggles, and taught them how to waft so they would not directly smell the liquid the egg had been placed in. The children had a great deal of fun learning how to waft and push the air toward their nose so they could be safe when smelling their egg. We did tell students...
that the liquid we put the egg in had a really strong smell and could burn their nose if we did not practice safety.

When we pulled out the eggs and gave one to each group, the questions began immediately! Why was the egg a different color? What happened to the outside? Why was it so big? Was it still an egg? What made the egg change? Why did the liquid smell so bad? Their curiosities about this object that looked similar to an egg had them hooked!

To refocus our curious students, we again had them make observations of the second egg using our graphic organizer. Students recorded words that described how the egg looked now. We used sentence starters to engage students in an interactive writing lesson about their egg.

After writing about our egg, we went back to the questions that students had generated. Some questions we could answer with simple answers, for example, “What happened to the outside of the egg?” We told the students the egg had been sitting in vinegar for 24 hours. We showed students a bottle of vinegar and passed out safety goggles for them to wear before giving each group another egg and container filled with vinegar so they could see what happened when the egg was put in vinegar. Doing this allowed them to see how tiny bubbles began to form on the outside of the egg. Keeping the science simple, we told students the liquid was so strong it actually broke down the shell or as scientists would say “dissolved” the shell off the egg. With the shell gone, the liquid was then able to move inside the egg, which is why it swelled up so big. Of course, to help students see that it was still an egg, we had to pop one! We gathered our scientists and allowed them to see what a popped egg that had been soaking in vinegar looked like on the inside. One of the students remarked that it looked the same! We went back to our box and T chart and again had students make observations to compare and contrast a regular egg to one that had been soaked in vinegar.

Elaborate

Although we were ready to move on to the next lesson in the unit, our students were not! Their questions would not stop coming. So, we used their questions to continue exploring and writing about what we learned. Students wanted to know what would happen if we put the egg that had been soaked in vinegar in water, so we tried it. We learned that the egg did grow smaller. We put it in colored vinegar and learned that the color did not move into the egg but stayed on the outside! Students were excited when we offered our own question to investigate. We asked “What would happen if we changed the liquid to thick corn syrup?” and “Would the egg get bigger or smaller?” to see

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**Figure 2. Comparing Eggs.**

**Directions**

We will use our eyes, nose, and hands along with these questions to help make a list of how the eggs we have observed are the same and how they are different.

What are we trying to compare?

Observe the two eggs. What words can we use to describe them?

How are they the same?

How are they different?

<table>
<thead>
<tr>
<th>Egg 1</th>
<th>Egg 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td></td>
</tr>
<tr>
<td>Texture</td>
<td></td>
</tr>
<tr>
<td>Color</td>
<td></td>
</tr>
</tbody>
</table>

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CAUTION
Decalcifying Egg Shells

Materials
- Raw eggs
- White vinegar
- A container to hold the vinegar and eggs
- Goggles

Directions:
1. Put the raw eggs into a container so they are not touching.
2. Add enough vinegar to cover the eggs.
3. Cover the container and let the eggs sit in the vinegar for 24 hours.
4. To remove the eggs from the vinegar, use a large spoon and carefully lift them.
5. Place them into a cup to make it easier to see.

Evaluate

Because this was our first unit during the year and we were just beginning to expand our children’s vocabulary using describing words, we did not spend a great deal of time formally evaluating the children. We did use the box and T chart to informally see where the children were with regards to seeing similarities and differences. During the next unit, students observed soil and designed investigations around soil and this gave us many more opportunities to assess. Students used a checklist for self-assessment (see NSTA Connection).

Tapping Into Curiosity

Curiosity may have killed the cat, but in our classroom, tapping into our children’s curiosity before we begin teaching content has made all the difference in how our students have learned to answer their own questions. Throughout all the activities in our first unit for the year, we worked with students to help them understand that the type of question asked can determine what they need to do to find answers to their questions. Students learned that sometimes they can design an investigation to answer their questions and other times they may find answers by reading books or even working with adults to find answers on the internet. Finding the answer might be as simple as cracking open their egg to see what was inside. By presenting children with experiences that counter what they believe, we have found it is easier to get students to generate questions instead of telling personal stories. Their insatiable desire to have their questions answered has become the springboard for teaching our students how to work, think, and act like real scientists. Even though we never mentioned the words independent variable, by December of this year our students understood that they had to change only one thing to see what would happen. They have come to learn that scientists ask questions, collect data, and record that data in order to write about it. Students also know it is important to use words and sentences to communicate what we learn to those outside of our classroom. Parents contact us wanting to know how they can answer the questions the children are generating at home! Our greatest joy has been inspiring our budding scientists to ask questions!

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References

NSTA Connection
For a self-assessment checklist, visit www.nsta.org/SC1012.

Connections to the Standards
This article relates to the following National Science Education Standards (NRC 1996):

Grades K–4
Content Standards
Standard A: Science as Inquiry
- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry