INQUIRY AT THE WINDOW: THE YEAR OF THE BIRDS

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This science inquiry in a fourth-grade classroom affirms the importance of observation, questioning, reading, and writing to the inquiry process.

School would start in about a week, and we (a classroom teacher and a university professor) were looking forward to a year of collaborative research in Phyllis' newly assigned fourth-grade classroom. While Phyllis was in the attic looking for a box of children's books, she tripped over a discarded bird feeder. She immediately thought of her portable classroom, with a crab apple tree growing outside one of the windows. An image of a child sitting by that window, watching and recording the daily activity of birds, flashed through her head. The feeder seemed to provide the perfect opportunity for children to engage in some scientific writing. We both believed in the importance of observation, writing for real purposes, and first-hand science, so we decided to hang this feeder, along with a hummingbird feeder, in the little crab apple tree and invite students to take turns observing during writing time. But there was no way we could envision that this was the beginning of what we would later call "the year of the birds."

This article is the story of our journey with a class of 26 fourth-grade students as we observed, questioned, and wondered our way to new understandings of the life of birds and the nature of inquiry learning. We wrote and read nonfiction together, questioning established facts and valuing the importance of precise language. We learned what it means to live the life of a scientist as we grappled with authentic scientific problems and brainstormed strategies for solving them. And we came to appreciate the generative nature of an inquiry exploration, as new insights provided not only answers but also fresh beginnings for further investigation. It was a year of unanticipated and rewarding insights and understandings, and it all began at the window.

Recording Our Observations

A few birds discovered the seed feeder before school opened, and we hung a blank "bird journal" beside the window. As the class settled into a routine, a different child volunteered to sit by the window each day and make entries in the journal. The observer shared his/her findings with the class later in the morning. Rhiannon was the second person to make an entry in the journal, writing a detailed report about two hummingbirds:

> I saw two hummingbirds fighting over the hummingbird feeder. And they came back. I saw a bird nest in the tree. One came back and drank up and down 17 times. They came back. The same two. [Note: All entries reflect edited spelling and punctuation for the reader's

Afterwards the class told Rhiannon what they appreciated about her entry, particularly her careful observation of the bird nest and the 17 sips. We also encouraged the children to ask questions about the information that was presented each day. The following interchange between Rhiannon and her classmates occurred during the sharing time:

> Scott: Did you see what color the birds were? Rhiannon: They were blackish and reddish. Shawn: How do you know one took 17 sips? Rhiannon: I counted.
> Danielle: How do you know it was a sip? Rhiannon: I saw the beak go into a hole. Stephanie: How do you know they were the same two birds?
> Rhiannon: They looked the same every time. Eric: How do you know it got some of the water?

This last question Rhiannon could not really answer definitively, explaining that she assumed it sipped some water because its beak moved in and out of the hole. The first question about the color helped to extend her

initial observation. Sometimes it is what children choose not to observe that leads to some interesting and productive conversations. Although Rhiannon did not record any information about color at first, her classmate's question caused her to expand her written description. The other queries that the children posed for Rhiannon concerned the validity of her observations: How did she verify it was a sip, or that it was 17 sips, or that it was really the same two birds? The children posed these questions, not in a belittling manner but in a truly inquisitive search for knowledge. The children continued to raise these kinds of questions throughout the year, realizing that sources of information are always open for examination, challenge, and debate.

Several days later Ashley wrote in the journal:

> I saw three or four hummingbirds.... They took several sips. The hummingbirds were yellow-green color with a little gray. Basically, they chased. If one was at the humming feeder, the other bird following would peck the other's body. One had a little reddish pink on the chest of the body. The food is going to be half gone because of one hummingbird.

Jenny complimented Ashley on her use of color to describe her observations. Stephanie complimented her on her use of the word "chase" to describe "how they were going around." Eric was intrigued by another word Ashley used and asked how she knew the birds were "really pecking." Ashley looked a bit hesitant and admitted she wasn't sure if they were "really pecking." David then asked the children, "What other words could we use besides `peck'?" They suggested: tap, bump, push, get the bird's attention, kiss, and nudge. Each of these words conjured up different images and helped the children understand that in their role as scientists they must be thoughtful about the words they use. They were also learning that living in a community of scientists entails certain responsibilities: When scientists share their observations, they must also be ready to justify the language they use to shape those observations.

Understanding the Limits of Nonfiction

After a few weeks of observing, we collected a wide assortment of books about birds for the children to read during reading and writing time. Many of the children soon chose to "do research" during writing time, so Phyllis decided to conduct a mini-lesson on notetaking (Graves, 1989). She had noticed that most of the students "researched" by opening a book; reading a section; and copying, paragraph by paragraph. Phyllis wanted to discuss with the children how to read information and then make it their own by "writing in their personal voice." She borrowed one set of Ashley's research notes, a copied description of blue jays. She read the article aloud to the class and asked volunteers to describe what they had heard. She recorded their

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ideas on an overhead transparency. For example, the passage described the jay as "a sentry of the forest" who warns of "approaching danger with its raucous, jeering *jeeah."* Jonathan suggested that the sentence told us that blue jays "warn other birds of a big thing coming. Other birds fly off." Phyllis recorded Jonathan's ideas and continued reading a sentence that described the jay's behavior as "aggressive" when defending its nesting territory. Rett recognized the word "aggressive" and explained that the bird was very brave, even a bully, and that other birds wouldn't try to pick on jays. Phyllis noted the children's interpretations of the text on the overhead, laid the pen down, and prepared to summarize the main points of the mini-lesson. In her mind, the mini-lesson was successful and complete because the children had interpreted the main ideas of the article in their familiar language. However, Shawn showed that the lesson was hardly over when he asked, "How can a bully help other birds?"

His innocent question jolted Phyllis from her complacency with the lesson. The real point of the lesson probably was not how to take notes at all. Shawn was showing us all that when learners read pieces of nonfiction, they must be critical, analytical inquirers. Our class had established a norm of questioning one another's observations. ("How did you know it was the same bird?" "How do you know that it took 17 sips?") Now Shawn was approaching an "authoritative" book with the same sense of skepticism. Phyllis decided to expand upon Shawn's idea. The real mini-lesson, the one from the children's agenda, was now the one that Phyllis knew she had to address.

She replied, "That's why you are such a smart class. That's what scientists do. They question and wonder about what they read. When you read and research, it's important to do what Shawn has done. Does anyone have a theory about why a bully might be able to help other birds?" Several children contributed:

Eric: Maybe blue jays really care for other birds.
Ashley: If they're *so* big and pretty, maybe their colors help warn other birds.
Danielle: Maybe blue jays care about *some* birds.
Billy: Maybe they warn other birds because *they* are scared.
Shunta: Maybe they're scared and not as brave with people.
Kevin: Why do blue jays sometimes act nice toward cardinals?

Kevin based his comment on his own observations at the window. He added a piece of information about the behavior of blue jays that seemed to contradict the main idea of aggression that the article was promulgating. His comment also gave support to some of his classmate's theories about how a blue jay could be both kind and aggressive. Reading an article, then, was not an "end" to a question but a beginning of a new cycle of questioning.

Through this and other conversations, the class realized the importance of questioning even authoritative nonfiction sources. Too often in school, children view nonfiction texts as repositories of definitive truths and unassailable facts. However, when children live the lives of scientists—carefully observing, questioning, wondering, and hypothesizing—then they soon come to realize that facts and theories are only tentative best guesses and that knowledge changes as further observations are made.

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Living the Lives of Scientists

Shunta taught our learning community another important lesson about what it means to live the life of a scientist (Doris, 1991). She loved observing birds from the very beginning. She even kept her own personal journal, partly because her seat was in a strategic place in the classroom that allowed her the opportunity to view birds throughout the day. When she recorded her first observation in the class journal, she wrote a lengthy entry; however, she said she was a bit frustrated because it was hard to write everything down: "Things happened so fast." We told the children that this issue was a legitimate problem that scientists face and asked them to suggest strategies to overcome it. As a collaborative group, we developed the following strategies:

1. Have two people watch the birds.
2. Have the observer talk into a tape recorder.
3. Use abbreviations when writing.
4. Draw a site map that observers can use to record bird position and movement.
5. Use a video camera so observers can revisit the activity later on.

Shortly thereafter, the children implemented several of these suggestions. They developed some abbreviations to help them write faster, such as *hb* (hummingbird), se (seed eater), and notations such as ' and " to designate minutes and seconds. Frequently, two or more children began to observe together, particularly during writers' workshop time. In addition, the children created several site maps, which we photocopied and kept in the bird journal. This discussion about recording observations was an extremely important one for the children; they were learning that they can only do what scientists do by encountering the problems that scientists encounter. Children will naturally encounter the problems of scientists when they have the opportunity to set their own investigation, observe closely, and pose their own questions. It may not be the sanitized, polished version of science that the basal science textbooks typically portray; but it is personal, authentic, and inquiry-driven.

About one week later Tony recorded in the class journal that he saw a hawk flying over the portable classroom. One of the children asked, "How did you know it was a hawk?" and Tony replied, "I could tell by its flight." We then noted this experience of Tony's as another common problem of scientists: How do scientists positively identify subjects from afar? We solicited strategies from the children, and they suggested the flight pattern, the shape of the bird's silhouette, and its call. Eric suggested placing a tape recorder on a stepladder beside the feeder so we could hear some of their unique sounds. Here again, a brief observation and conversation helped to highlight the legitimate problems that real scientists encounter (see Figure 1).

Developing a Never-Ending Trail of Questions

Inquiry explorations have a generative nature to them; as learners construct new knowledge, they do not

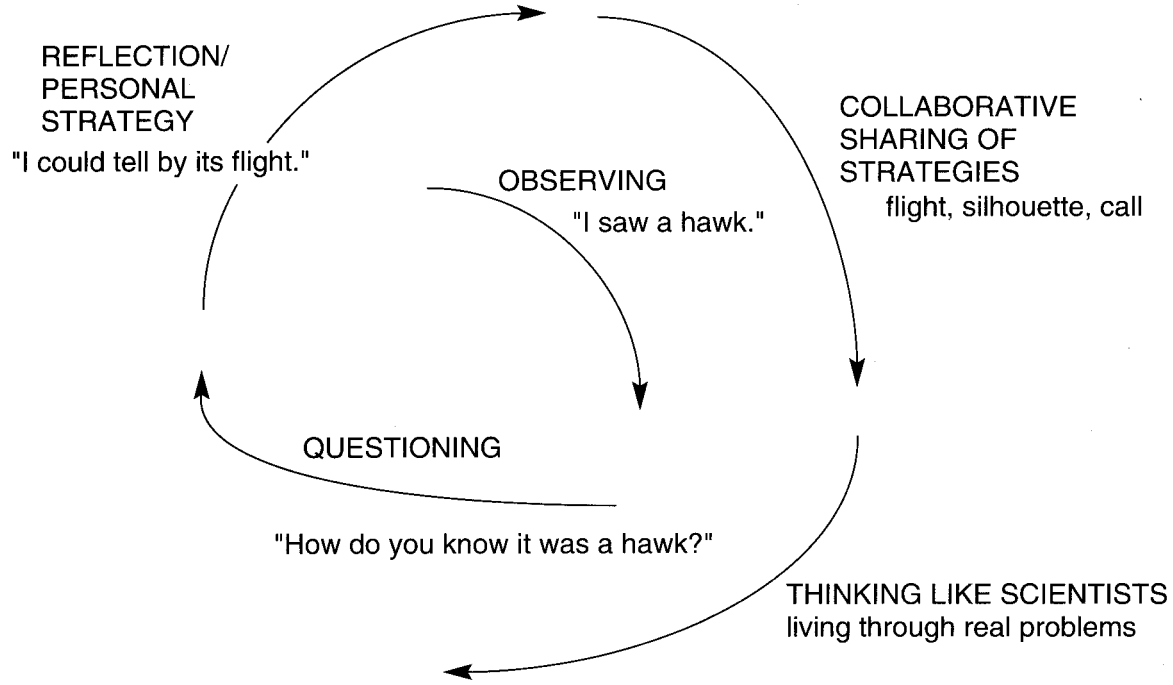

Figure 1. Children's Strategies and Language Thinking Like Scientists

become complacent about what they know but use their developing knowledge base to pose fresh questions for investigation. This incessant inquisitiveness also leads to a flexible use of nonfiction resources as learners use a variety of texts in multiple ways to answer questions. These aspects of an inquiry investigation were highlighted when the children began to look closely at the eating behavior of birds.

Kevin was one of the first observers to notice habits of seed-eating birds. When he gave his report to the class on August 29, he noted, "It ate like a shark." He stopped reading at these words and demonstrated with his jaws a wide-mouthed, hasty chomp with the accompanying sound effect, "Grrrrump." We were intrigued by Kevin's analogy and knew that the use of metaphor or analogy can be an effective strategy for learners in developing scientific understanding (Gallas, 1994). The class spent a few minutes talking about what images "eating like a shark" brought to mind. Chris said he thought the bird grabbed the food. Kevin then refined his description by explaining that the bird was a messy eater and spilled a lot of food, emphasizing the speed of a shark's eating habits rather than the shark's violent nature. In this way Kevin's sharing of his analogy helped him clarify and extend his initial observation. We realized that Kevin's observation about the eating behavior of birds could be a foundation for investigating the relationship among types of feeders, types of seed, and the habits of species of birds.

Interest in the eating habits of birds continued. In an observation written in mid-September, David noted that a lot of seed was strewn on the ground and wrote, "I wonder if birds are sloppy eaters or if they don't like the seed." David knew that the current seed had been purchased at a grocery store and that more premium mixtures were available; he wanted to draw attention to this issue before the class purchased any more seed. When he shared his observations with the class, Ashley, who had been filling the feeders that week, commented that there was a lot of seed on the ground. Noting these questions and concerns, we invited any interested students to meet us at a bird specialty shop on Saturday in order to purchase our next supply of seed.

Ashley and Jenny met us at the "bird store," and we encouraged them to describe our investigation to the owner, Mr. Kelly. He showed the girls various kinds of seed, explaining that "grocery store seed" contains at least 50% milo, which is primarily a filler. He said that birds toss milo onto the ground as they search for the seeds of their choice. Sunflower seeds, he told the girls, are the most popular because they are rich in oil, which birds need for energy and for their feathers. Then Ashley studied the milo Mr. Kelly presented and confirmed that it was indeed the variety of seed that was most plentiful on the ground below the feeder. Finally, Mr. Kelly predicted that the birds would prefer a seed mixture with less milo and more sunflower seeds.

Ashley and Jenny decided that we ought to test out Mr. Kelly's "deluxe" bird seed, and we decided to show the rest of the class a sample of this mixture. On the following Monday, Phyllis passed out two cups of seed to pairs of students, one filled with grocery store seed, the other with the newly purchased "deluxe blend." The children noted the differences in the composition of each seed mixture and then listed some of their own wonders: Will we get more colorful birds? Will we waste less seed with the new seed? Do birds eat the shells of sunflower seeds? Ashley and Jenny then reported to the class about their interview with Mr. Kelly. Over the next several weeks, students used their new knowledge as a lens for viewing the behavior of birds at the feeders. They did find less seed scattered on the ground beneath the feeders, confirming Mr. Kelly's prediction. The children also noticed that some birds ate on the ground; some perched on the feeders, eating for long periods of time; and others snatched a seed and flew immediately to a nearby tree.

Once again these observations at the window led to new questions and wonders: Which birds prefer which seeds? Why do some birds eat on the ground? As the seed supply was nearly depleted once again, we decided to evaluate the success of the deluxe mix that the class had been using. Was this composition the best choice? Was the class satisfied with the amount of waste and the species of birds that the feed was attracting? What other options for purchase were possible? Before visiting the store, the class needed to make an informed, collaborative decision about a purchase. Deidre and Danielle volunteered to read an article on seeds from a magazine that we had bought at the bird store. They spent most of the morning reading the article and describing their findings. When Phyllis stopped by their table, she had to smile at the organization of their ideas. They had developed two sheets, one listing the advantages of several varieties of seed, the other listing "wonders." Their report, which they transferred to overhead transparencies to share with the class, read as follows:

Facts

Oil content means lots of energy for the birds. Black oil sunflower seed. You can put millet on the ground, but we found out that you can put it

Millet
Black oil sunflower
Striped sunflower
Premium wild
Blended Sunflower
Sunflower chips
Safflower seed
Peanut bit pieces
White millet

Wonders

1. We wonder if birds like oil content.
2. We wonder if birds like peanut bits.
3. We wonder why birds like some seeds but not others.
4. We wonder why birds like black seed the most.
5. We wonder why birds like peanut butter.
6. We recommend peanut butter-chunky, if you want to offer peanut bits.

The article reported that oil content was important for the birds, but the girls questioned whether the birds would actually like seed that had such a high oil content. The article also stated that some seeds, such as sunflower, were more appealing to most birds than other seeds, such as safflower; the girls wondered why. These girls were refusing to accept the facts in the article without question; they probed beneath and beyond those "facts" and presented their information to the class for discussion. Students had wondered about birds eating from the ground; the girls' report showed them that millet is a favorite seed to put on the ground, specifically for ground-feeding birds. Since the mixed seed from the grocery store had contained a lot of waste, the group was interested in buying more desirable varieties. Based on the information that Deidre and Danielle presented, the class voted to buy black oil sunflower seeds for the tube feeders and millet to put on the ground.

Ready to carry out the class's decision, Rett, Jenny, and Ashley met us at the store the next morning. They asked Mr. Kelly's assistant about her view of the proposed purchase. She confirmed that millet was an excellent choice for ground feeders, and that black oil sunflower seeds contained the highest amount of oil possible. Since winter was coming, she said that the oil was especially important for the birds. It helped protect them by waterproofing their feathers, and it provided a concentrated form of energy to keep birds warm. However, she argued that a seed mixture would attract a greater variety of birds; and she showed the children a new blend of seeds that featured both kinds of sunflower seed, peanuts, and safflower seeds. Now the students faced a dilemma: Should they buy this new blend or abide by the class decision? The students were attracted by the idea of including peanuts, since peanuts and peanut butter were reported to be appealing in the article, but they were concerned about the inclusion of safflower seeds. They recalled that the first bag that the class had purchased at the bird store had contained 25%

safflower seeds. When the children learned that this new mixture contained only 10% safflower seeds, they decided to take the risk and purchase this new blend that the store was promoting.

Like Mr. Kelly, the assistant acted as a new text for the children to consider. She confirmed the children's current insight about millet but provided new information about safflower and sunflower seeds. The children were confronted with a variety of pieces of information and yet wanted to make an informed, responsible decision. Thus, they were forced to consider multiple texts: a magazine article, a class discussion, and a conversation at the bird store. All were important nonfiction resources for them to consider. Their dilemma was a real one; authentic problem solving does not take place behind the artificially contrived experiences of a science or mathematics textbook; rather, problem solving occurs with real people looking at real issues in real contexts.

Reflecting on the Features of an Inquiry Investigation

As we reflected on this curricular adventure, we realized its potential for highlighting significant features of inquiry learning. First of all, we learned that inquiry begins with looking closely. Observing with a wondering eye is the hallmark of scientific inquiry. Inquiry learning is born in wonder and sustained in wonder. Second, we learned that inquiry involves really living the lives of scientists; Shunta, for example, helped us all see that an important facet of scientific life in the classroom is grappling with the real problems of scientists, such as devising strategies to record information quickly and accurately. Third, we learned that inquiry generates an endless spiral of questions to pursue. Our investigation into the eating habits of birds clearly showed how new information not only solved current questions but also served as the basis for posing more informed questions. Fourth, we learned that inquiry involves a flexible use of various nonfiction resources. Thus, inquiry learning lies not in new textbooks, packaged programs, or curricular edicts. Instead, the real sustaining force of inquiry learning lies at the window because that's where learners meet the world face to face.

References

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