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**Teaching Content and Literacy
Across the Curriculum**

Heidi Mills

Foreword by Lucy Calkins

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Foreword

It was the videotapes of instruction at the Center for Inquiry (CFI) that first drew me in. I was floored by the vibrancy and rigor I saw on the clips that Heidi and Tim O’Keefe showed us during their keynote for the Day of Early Childhood at a National Council of Teachers of English (NCTE) conference. I—and the rest of the audience—urgently wanted to learn more. The teaching resembled reading and writing workshop instruction at its best, yet it also had a new depth and dimension. Perhaps part of what made me teary, watching those tapes, was the flood of nostalgia I felt for the olden days when teachers and children sang Pete Seeger songs lustily, and when lop-eared rabbits hopped about our classrooms. But much more than this, the videos of Tim’s second- and third-grade classrooms and their discussion of them allowed me to see the power of truly taking the principles of reading and writing instruction across the curriculum. They showed me social studies, math, and science being taught in ways that gave students agency, that valued dialogue and inquiry, and that extended all that students learned from strong reading and writing workshops. To me, those video clips represented a next step for my entire organization.

Whereas typically the Teachers College Reading and Writing Project sends its staff to a national conference each year, that year fifteen of us flew to the tiny airport in Columbia, South Carolina, to spend a day learning from Heidi and the faculty at the Center for Inquiry. I count that one day as one of my most powerful days of learning ever.

As Heidi and I spoke later that evening, after a full day of visiting in half a dozen classrooms, I said to Heidi, “You owe it to the world to publish your work, through your videos and a book to go with them, so that others can see what my colleagues and I saw today.” Little did I know that within a few years the Common Core State Standards (CCSS) would make it even more urgent that teachers across the nation learn from Heidi and her colleagues. She offers us a model for teaching and learning that allows children to achieve the rigor of the CCSS and to experience the joy that inspires them to learn more and work harder.

Exactly one year ago, I got a phone call. Heidi had discovered that she had a dangerous illness. It wasn’t clear if she’d be okay. It seemed to me the state of South Carolina and the literacy leaders of the nation held our collective breath. We each did all we could do, sending her our prayers, our meditations, our best vibes, our most

fervent hopes. I do not know what the prayers of others were, but mine included the prayer that she would have the chance to bring the beauty and power of her teaching to the whole world so that hundreds and thousands of children could learn in classrooms like those that my colleagues and I saw in her tapes and in her life when we visited CFI.

Heidi got better. And now, *hallelujah!* You have the opportunity to make the same journey that we made. You'll draw your chair alongside second graders as they work together to reconstruct a bat skeleton, their actions informed by posing questions, hypothesizing about bat physiology, and consulting print resources. You'll see first graders sharing observations and questions about the moon, and you'll see kindergartners living as ornithologists. You'll see first graders inquiring into rocks and soil, third graders composing a song about civil rights, and fifth graders creating their own magazines. Heidi shows us that when students' ideas are taken seriously, when their potential is not limited by our imagination but instead is supported through exploration and learning the skillfulness of inquiry, they can do work that is better than anything we could assign to them. This book and video brim with student work and student voices. By pulling your chair close and leaning in, you'll learn next-step ways to help students grow into the mathematicians, historians, readers, writers, inventors, and scientists that we need, and that they want to be.

If you're anything like my colleagues and me, this journey will change you; it will change you because it will allow you to live your ideals. You will see how focused inquiry is not overwhelming or chaotic, and how it can be used to create units that exceed the standards when framed as invitations for children to be engaged, curious, responsible, reflective people. You'll return to your own classroom filled with resolve to take all that you know about powerful reading and writing instruction and do even more than the Common Core State Standards ask you to do—only you'll do this work not because of a mandate, but because of love. Love of teaching, of kids, of each other, of reading and writing and inquiry. Love of the world.

—Lucy Calkins

Introduction: Teaching as Inquiry

We all know how exhilarating it is to learn something new, to develop expertise around a passion, to share with a community, to learn alongside others who are deeply interested in the same topic, sport, or hobby. We've experienced this since we were very young, although we may not remember it. The natural wonder that propelled us through childhood is still deep inside us—and inside the children we teach. When we watch a child drop to the ground to observe a spider, dash to her room, grab a field guide, and then match the live specimen to a photograph, we remember what it means to inquire: to follow the logic of an authentic question.

Each time we encounter an anomaly or witness a spectacular natural phenomenon, we wonder about it. We gather information when adopting a baby or preparing to give birth ourselves. We investigate how to make wise choices when purchasing a car, helping the homeless, playing tennis or golf, learning to quilt, becoming a beekeeper, or taking up gardening. Whenever we advocate for a social, spiritual, or political cause (or just plan a vacation), we remember what authentic learning looks, sounds, and feels like.

What Is the Process of Inquiry?

When learning something new we seek to understand first by making careful observations and posing pertinent questions. We learn about the tools or resources of the discipline and how to use them. We talk with others. We seek out mentors. We develop the unique vocabulary used in the discipline, first to comprehend and then to share our thinking. We compare what we notice in life (*primary sources*) with information others have compiled (*secondary sources*). We reflect, read some more, and pose new questions. Then we gather additional information from direct observation, published research, and trusted personal sources—doctors, social workers, clergy members, coaches, travel agents, consumer advocates. When we truly care about a topic, we deliberately inquire. We embrace the process naturally as we amass critical information and learning strategies. When we are invested in our personal inquiries, we lead passionate, wide-awake lives.

Learning something new involves investigating how others—biologists, climatologists, anthropologists, historians, authors, and botanists—go about it. This is just what

we can do as teachers to bring content and literacy learning to life in truly authentic ways. Kindergarten and first-grade teacher Susan Bolte recently sent me an email describing a unit of study she is writing for her young scientists:

I want to communicate to the kids just how exhilarating it is to be out in the field, doing the real and important work of scientists. I want them to experience the satisfaction of experiencing the world, wonder about the things they have experienced, and then create ways in which to answer their own questions.

Hers is a vision so many teachers share but wonder how to bring to life.

Given today's complex demands of public school teaching—the codified standards and formal assessments—you may think this vision of teaching is too Pollyanna for the realities of your teaching life. I understand. But I've shared these stories, strategies, and video clips with teachers in very diverse settings across the United States and Canada. They have taken these beliefs and practices and made them their own, in their own ways. And in the process they have rediscovered the joy of teaching.

Teaching through inquiry doesn't mean more (or less) work. It means acknowledging that what we do every day in the classroom with our students is creative, strategic, and reflective. True teaching is learning. Our teaching practices model the processes of inquiry we want students to own and use for themselves. But this is more than just demonstration. Like all relationships, teaching is reciprocal. By viewing teaching as inquiry, we get back as much—maybe more—than we give. We allow ourselves to be surprised. We accept that we, and our students, don't know everything, but that we can get smarter together. We create learning experiences that give us, and our students, the space to grow.

When Susan Bolte invited me to join her first graders' journey through astronomy, I didn't expect to be changed by the experience. You'll find her unit online, and you'll read more about her teaching and see a video clip in Chapter 7, but first let's think about how we as adults can be changed by our teaching. For example, even though I earned an A in astronomy in college, Susan's first graders taught me how to see the moon with new eyes. I always appreciated the moon's natural beauty, but now on my nightly walks with my husband I pause with a sense of wonder at what I know about the moon and how it's connected to what I see. I am now more intentional, more contemplative as I live and learn. When I glance into the sky or notice the moon's reflection on the lake, I think of Susan and her first graders sharing their moon journal entries, of their connections and questions. Susan and her first graders brought astronomy to life in ways that mattered. We all learned a great deal—and we were changed by it.

We Don't Have to Know Everything

The emotion of joyful surprise at something unexpected—wonder—can only happen if we accept that we don't know everything. The capacity for wonder is innate in human beings. Whenever we learn something new, our brain experiences the same biochemical reaction of pleasure at discovery as the first person who made that discovery. Our brains are made to motivate us to learn more: when we learn something new, our brains release dopamine, which rewards us for our learning efforts and reinforces this learning behavior. If we understand what triggers the emotional response of curiosity, then perhaps we can dismiss the idea that teachers need to know everything and instead focus on how we can nurture our students' curiosity and our own.

We Give Ourselves Opportunities to Pay Attention

To foster curiosity, we have to give ourselves opportunities to pay attention, which are acts of willful selection: choosing one thing to observe while ignoring others. Think about our busy lives and the chaos that can be a school day: In the flurry of trying to do everything, we often never fully do anything. In Chapter 1, I explain some classroom structures and strategies that support the act of paying attention. However, it's also worthwhile to think about how we can give ourselves opportunities to pay attention. We don't need to restrict ourselves to school-related subjects. Although reading is an act of paying attention, it doesn't have to be the only one—people-watching on the bus, walking through your neighborhood, and trying to listen more and talk less are all acts of attention. Being mindful of where, and how fully, we direct our attention can make us better teachers.

We Question What We Know

Attention is observation. We identify what is familiar and what is unfamiliar, what is known and unknown. In Chapter 2, you'll learn how to scaffold students' observations through specific tools and strategies so they can identify and reflect on their observations. However, part of identifying what we already know means being open to the possibility that what we *think* we know might be wrong, or that we might not know something as fully as we could. This may sound like a philosophical riddle, but consider, for example, what it means to know a place. Knowledge of it develops over time and through a variety of experiences. We may think we understand a place—its culture and the people who live there—but, especially if we haven't been there before, we risk stereotyping or jumping to conclusions without first observing and questioning.

We Know and Let Ourselves Be Known by Our Students

What does this mean for us as teachers? The most important modeling we do is showing that we're curious about what children think, that we're open to being surprised and impressed by them. Fourth- and fifth-grade teacher Julie Waugh describes it as "unanxious expectation." We simply expect that children will say or do something thoughtful, brilliant, or helpful. When children know that we're interested in and care about the thinking they generate, they become more invested in taking the risks and doing the work required to develop their own thinking. What's more, when they realize that their thinking also informs and supports the work of the class as a whole, they feel an even greater sense of responsibility about their learning. We lay the groundwork through planning (Chapter 7), recurrent structures and practices (Chapter 8), and our stance as inquiring teachers, but the daily life of the classroom has the energy of true collaboration, just like any good conversation.

We set expectations for classroom inquiry to be joyful, meaningful work by:

- creating opportunities for our kids and us to teach and learn from everyone in the room,
- maintaining habits of reflection, both for our kids about their learning and for us about what and how our kids are learning, and
- asking our kids to use the information gathered through ongoing reflection to identify their strengths and needs as learners.

By doing these things, we know our kids better, our kids know their classmates and us better, and our kids know themselves as learners better (see Figure I.1, Mills 2005).

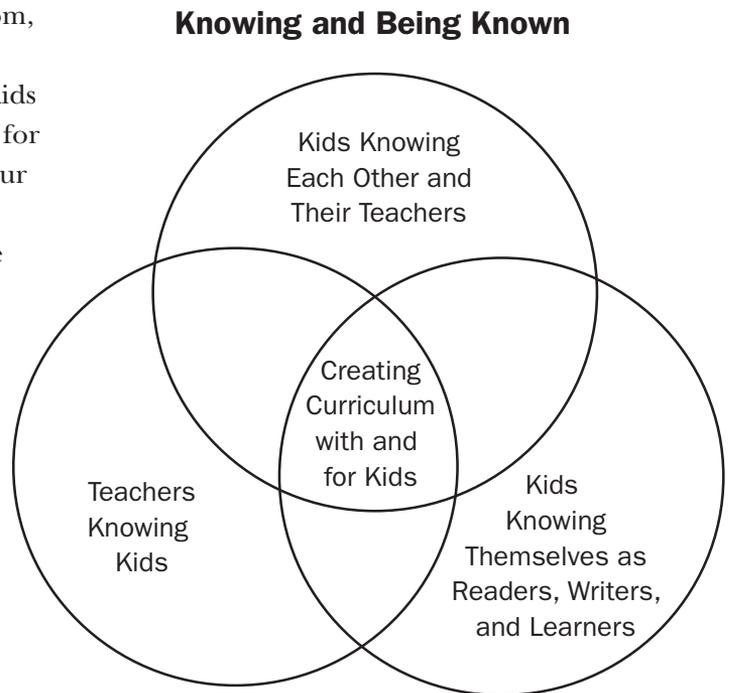


Figure I.1

Our Approach to the Process of Inquiry

Each time we teach an inquiry unit we have a fresh experience—we do not simply walk our children through a set of predetermined activities. We bring our plans to life in concert with our students. This may sound pie-in-the-sky, but let’s think about what this can look like in our classrooms. A simple shift in our thinking and planning can transform how we teach content and content literacy:

- Instead of teaching about plants, we invite children to think, work, and communicate as botanists.
- Instead of teaching about a culture, we help children pose questions and make observations as anthropologists.
- Instead of teaching about insects, we show children how to look at the world and use the tools of entomologists.
- Instead of teaching about history, we explore how historians use primary and secondary sources to reconstruct events and record stories of significant moments.

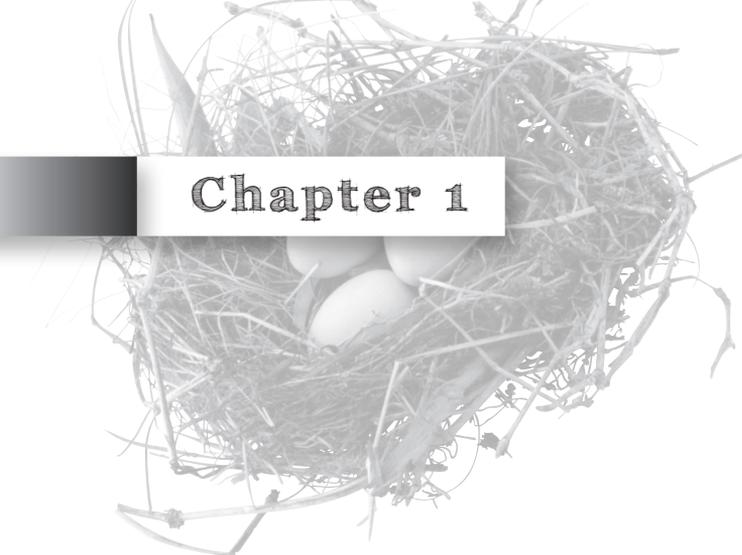
This shift in thinking reframes how Susan Bolte constructs her first-grade curriculum. Her curriculum does more than cover topics; it provides students with experiences that help them grow into strategic readers, writers, mathematicians, scientists, and social scientists. Susan and her K–5 colleagues devote as much time to teaching children *how* to learn as *what* to learn.

In this book, you’ll learn how to plan for inquiry in a way that promotes literacy throughout the day and across the content areas. In the video clips, you’ll see what that can look like in a variety of classrooms. A few years ago I asked two Center for Inquiry fifth graders what made their school special. One exclaimed, “It’s cool to know things here!” The other answered, “Our school is a reading machine.” They were describing a school culture in which literacy and content aren’t separate but linked. This link is not idiosyncratic or ephemeral. It is based on the following universal processes of inquiry, which are relevant to small and tall learners, novices to experts, in all content areas and professions.

- Carefully observe the world using the tools and strategies of the discipline (Chapter 2).
- Pose questions and investigate/solve problems from numerous perspectives (Chapter 3).
- Access primary and secondary sources in complementary ways (Chapter 4).

- Use the language of inquiry and disciplines to learn and communicate new understanding (Chapter 5).
- Use reflection and self-evaluation to grow and change (Chapter 6).

As Carl Sandburg put it, “Nothing happens unless first a dream.” In this book, lots of classroom-tested tools will help you realize what you dream for your students. These tools are not scripts, but structures and strategies that will give you what you need to be your best as a teacher and help your students reach their potential. After all, teachers need as much space as students do to grow and innovate. Here you’ll find the support needed to build curriculum based on children’s lives as well as fulfill the expectations of the Common Core standards or district/state expectations. Trying something different often means taking a risk, and there’s plenty of evidence here to prove that doing so is worth it!



Chapter 1

A Cross-Content Area Vision of Balanced Literacy

Before we jump into the “how-to,” let’s first address some of the thinking that makes teachers resistant to inquiry, particularly at the primary grades. Some argue that reading instruction in grades K–2 should be focused solely on supporting children in learning to read and write so that later, in grades 3–5, children can focus on reading and writing to learn. This distinction is artificial, and I’ll explain why.

Learning to Read While Reading to Learn

As soon as children are read to, they show awareness of both content and the way the content is delivered. They’re reading to learn while they’re learning how to read. They may not be able to name all of what they’re experiencing in a text, but they’re experiencing it; to pretend otherwise is to limit important learning opportunities for kids. Part of offering rich learning experiences for kids is exposing them to many different kinds of texts right away. I’ve seen how kindergartners can navigate, interpret, and compose nonfiction texts—if teachers provide the right support. At the Center for Inquiry (CFI), teachers give equal attention to strategies for reading and writing

both nonfiction and fictional texts. Kindergartners learn nonfiction text features and structures alongside noticing and naming capital letters, punctuation, onset and rhyme patterns, story structure, alliteration, and so on. Young readers build their understanding of texts so that they learn when to use strategies; some strategies are helpful for any text and others are specific to the kind of text they're reading. When nonfiction texts are an integral part of classroom life, kindergartners and first graders select them as often as fourth and fifth graders do during independent reading. When, from the beginning of their literacy careers, students compose nonfiction texts during writing workshop and during integrated units of study, the value and understanding of nonfiction texts is reinforced and deepened.



When a child chooses a book on red-eyed tree frogs, for example, he's most likely choosing it because of his interest in the topic and/or the design of the book. He might also be choosing to read it because a teacher has structured independent reading time, because he's been told to pick from a collection of books on amphibians, or because he knows he can read that book without too much difficulty. All of these reasons for reading this particular book are interconnected. *Learning about* and *learning through* are ongoing—and inseparable—processes. Regardless of the standards or unit of study, reading is a vehicle for students to develop their understanding of the world.

If supported, students inquire during reading and writing workshops as much as they do during integrated units of study in the sciences or social sciences. Michael Halliday explains that children need opportunities to learn language, learn about language, and learn through language (1975). This is what we mean by “balanced literacy.” Reading and writing workshops are curricular structures that give students lots of reading and writing time, and they are done in an authentic context. They learn by doing, just as children learn to talk by talking, and practice produces more

accomplished, strategic, effective readers and writers. Not “independent practice” of a specific strategy or understanding, but self-directed use. We want students to have experiences that are discoveries for them. “What happens if . . . ?” Wondering and finding out is self-directed inquiry that drives real learning.

Reading and writing workshops provide space and time for students to investigate the ways writers can effectively construct and share meaning (well-crafted language, wondrous words, text structures and features). By establishing a connection to science and social studies through cross-content area units of study, students transfer what they’ve learned in meaningful ways; that is, they learn through reading and writing when inquiring in the sciences and social sciences.

As I work with teachers across the country, I’ve noticed that, as a profession, we have made tremendous progress in establishing solid reading and writing workshops. We understand that effective reading and writing workshops promote learning about language and learning through language (Mills, O’Keefe, and Jennings 2004; Short 1997). This book and the accompanying video clips extend that idea to content learning and content literacy. It’s about thinking strategies that make a difference across content areas. For too long, literacy practices have been artificially constricted in schools. The United Nations Educational, Scientific and Cultural Organization (UNESCO) defines literacy as:

the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society.

We’ve done good work addressing the first sentence of the definition, but how consistently have we addressed the second sentence in our classrooms? Not enough yet, but we can.

Learning to Read and Write While Learning About: Kindergarten Ornithology Unit

By teaching children processes for learning, we help them learn how to learn. We are teaching them how to explore, understand, and communicate as readers, writers, mathematicians, scientists, and social scientists. This stance makes all the difference in the world: it makes them self-sufficient, or at least brings them closer to self-sufficiency.

The processes of inquiry aren't invisible. Walking into Dori Gilbert's kindergarten classroom (Figure 1.1), you see them at work. On display and in use are artifacts of students' experiences learning how to learn (processes and strategies) and what to learn (content). Take a virtual tour by studying the photographs. How and what are children learning about birds? After you've reflected, read my explanation.

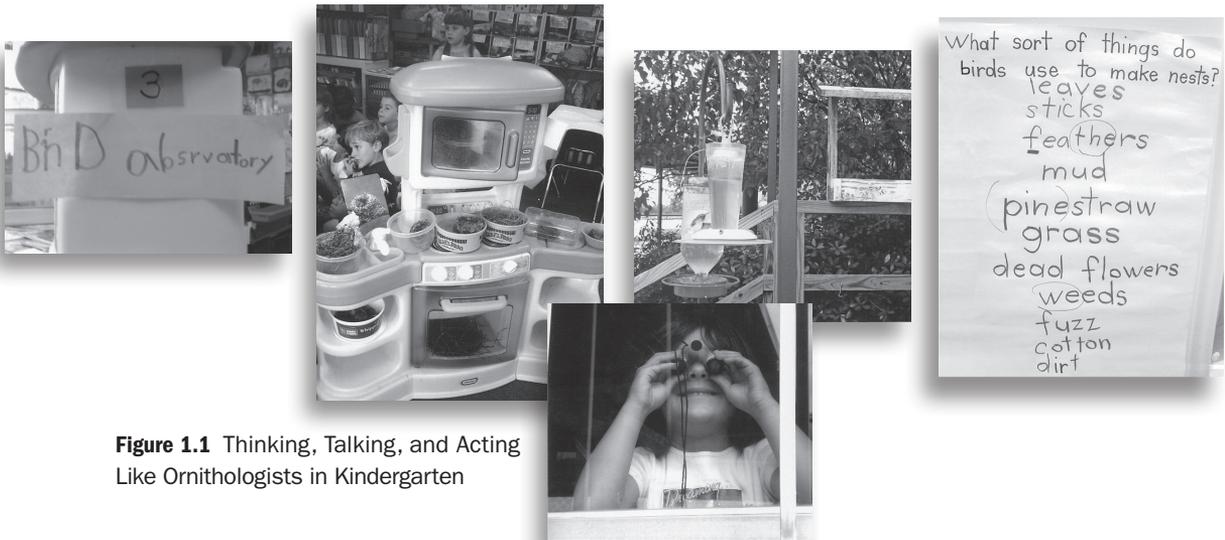


Figure 1.1 Thinking, Talking, and Acting Like Ornithologists in Kindergarten

Carefully Observe the World Using Tools and Strategies of the Discipline

Because Dori wants her students to observe birds carefully using the tools and strategies of ornithologists, she creates a bird observatory in her classroom stocked with diverse bird nests and feathers, binoculars for bird watching, and magnifying lenses to examine the nests' and feathers' material and construction. This observatory isn't a classroom decoration; it's an active place for five and six year olds to work as ornithologists.

Ornithologists are intentional and systematic about documenting the birds they spot, and Dori's birders learn to do this well. Students document their bird-watching observations by completing a bar graph featuring birds sighted on the school grounds (Figure 1.2), or sketching and writing about live birds or artifacts such as feathers and nests in the class bird journal.

During science workshop, in small groups or as a class, they develop strategies for collecting and analyzing data about birds. Dori takes her students outside where they identify the birds they see, carefully coloring a box in the appropriate column of a graph they're carrying on a clipboard. After Dori is confident the children understand how to identify common birds found in South Carolina in the winter and how to

graph quantitative data, for homework the children collect, analyze, and display information on the birds they see at home.

Use the Language of Inquiry to Learn and Communicate New Understanding

To help students not just understand but also use the language of ornithologists, Dori creates a “wondrous word wall,” starting with words from her daily read-alouds and adding more as students share their learning. Dori keeps a packet of sticky notes and a pen next to her rocking chair. Before reading aloud she reminds her students to listen for interesting, beautiful, or puzzling words that ornithologists use. After she finishes, students share words they notice (*fledgling*, for example), and talk about and reflect on them. Then Dori writes these wondrous words on sentence strips, asks the children who



Figure 1.3

Pose and Investigate Questions from Numerous Perspectives

Dori encourages her ornithologists to pose questions as they observe nests, feathers, and bird behavior and as they read or listen to books about birds. Then she posts their questions (see Figure 1.4) and identifies patterns among them. She plans teaching demonstrations, designs learning engagements, and collects resources that help the students investigate their questions. She often launches a science workshop

Data Collection
Which birds do we see at CFI

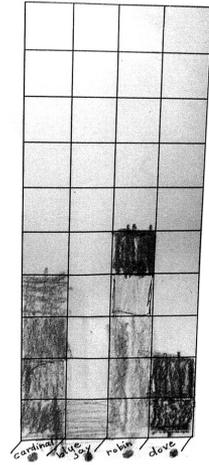


Figure 1.2

shared the words to illustrate them, and posts the wondrous words with illustrations on the wall (see Figure 1.3). The wondrous words wall is referred to regularly during writing workshop when children compose nonfiction texts about birds, allowing them to write many sophisticated scientific words conventionally. Their ownership of these words is one more aspect of their taking on the identity of ornithologists.

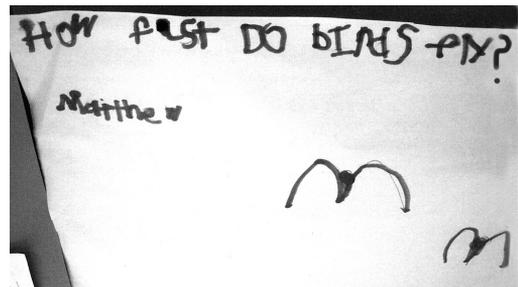


Figure 1.4 Shared Question

demonstration with one or two “I wonder” questions, explicitly connecting the questions with the work students are doing together as ornithologists. She also chooses daily read-alouds that will answer these questions. Later, when several children ask questions about the speed and height of birds’ flight, she invites them to read their questions to the class and asks students to listen for possible answers as she reads aloud a story that includes this information.

Strategically Access Primary and Secondary Sources in Complementary Ways

Dori has her students observe primary sources (live birds, feathers, nests) and pose questions about what they notice. Next she demonstrates turning to secondary sources, such as nonfiction books, magazines, and websites, to investigate or explore their questions. For example, Gail Gibbons’ books—*Owls* (2006), *Penguins!* (1999), and *Chicks & Chickens* (2005)—each explain one species of bird, but by comparing and contrasting the characteristics of each species, students learn important shared and distinguishing characteristics.

When a number of students wondered how birds build nests and what materials they use, Dori taught them to use magnifying glasses (as scientists do) to analyze bird nests carefully. Students solidify and extend their observations by sketching and labeling nests (see Figure 1.5).



Figure 1.5
Pine Straw, Sticks, Cotton, Mud, Food, Leaves

Mud and Sticks and Feathers

Then Dori reads excerpts from several informational texts, particularly those with strong images (see Figure 1.6), to help students better understand how and why birds build nests from different materials in different locations.

Andersen, Hans Christian. <i>The Ugly Duckling</i> . New York: Knopf, 1986.
Anholt, Laurence. <i>The Magpie Song</i> . Boston: Houghton Mifflin, 1996.
Bunting, Eve. <i>Secret Place</i> . New York: Clarion Books, 1996.
Carlstrom, Nancy. <i>Goodbye, Geese</i> . New York: Philomel Books, 1991.
Deedy, Carmen Agra. <i>Agatha's Feather Bed: Not Just Another Wild Goose Story</i> . Atlanta: Peachtree Publishers, 1991.
Ehlert, Lois. <i>Feathers for Lunch</i> . San Diego: Harcourt Brace Jovanovich, 1990.
Fox, Mem. <i>Feathers and Fools</i> . San Diego: Harcourt Brace, 1996.
George, Jean Craighead. <i>Luck</i> . New York: Laura Geringer Books, 2006.
Gibbons, Gail. <i>Gulls, Gulls, Gulls</i> . New York: Holiday House, 1997.
Gibbons, Gail. <i>Owls</i> . New York: Holiday House, 2005.
Gibbons, Gail. <i>The Puffins Are Back</i> . New York: HarperCollins, 1991.
Gibbons, Gail. <i>Soaring With the Wind: The Bald Eagle</i> . New York: Morrow Junior Books, 1998.
Knowles, Sheena. <i>Edward the Emu</i> . New York: HarperTrophy, 1998.
Lewin, Betsy. <i>Booby Hatch</i> . New York: Clarion Books, 1995.
McMillan, Bruce. <i>The Days of the Ducklings</i> . Boston: Houghton Mifflin, 2001.
Peters, Lisa Westberg. <i>This Way Home</i> . New York: H. Holt, 1994.
Ring, Elizabeth. <i>Loon at Northwood Lake</i> . Norwalk, CT: Soundprints, 1997.
Rockwell, Norman. <i>Willie Was Different: A Children's Story</i> . Stockbridge, MA: Berkshire House Publishers, 1994.
Sierra, Judy. <i>Antarctic Antics: A Book of Penguin Poems</i> . San Diego: Harcourt Brace & Co., 1998.

Figure 1.6

continues

van Frankenhuyzen, Robbyn Smith. <i>Adopted by an Owl: The True Story of Jackson the Owl</i> . Chelsea, MI: Sleeping Bear Press, 2001.
Willis, Nancy Carol. <i>The Robins in Your Backyard</i> . Montchanin, DE: Cucumber Island Storytellers, 1996.
Wright, Lynn Floyd. <i>The Prison Bird</i> . Columbia, SC: Worry Wart, 1991.
Yashima, Taro. <i>Crow Boy</i> . New York: Viking Press, 1955.
Yolen, Jane. <i>Owl Moon</i> . New York: Philomel Books, 1987.
Science Kit
Echols, Jean. <i>Penguins and Their Young. Great Explorations in Math and Science (GEMS)</i> . University of California at Berkeley: Lawrence Hall of Science, 1996.
Film
<i>March of the Penguins</i> . Warner Brothers Entertainment Inc., 2005.

Figure 1.6 continued

Texts were chosen not for coverage of topics on standards, but for their ability to synthesize and reflect experts’ (in this case, ornithologists’) understanding and curiosity. In this way, no one text becomes a single authority; instead, students learn to evaluate and synthesize understandings across primary and secondary sources.

Use Reflection and Self-Evaluation to Grow and Change

Scientists regularly reflect on their own learning as well as that of their colleagues, so Dori invites her students to have this same experience. Reflecting on content and processes deepens learning and gives children opportunities to teach and learn from one another.

Talk is an important tool for reflection. Because Dori knows that kindergartners’ oral language often conveys their understanding better than their writing and drawing, she often documents the words and phrases students use when talking about birds. She pays careful attention to whether children are using words such as *herbivore*, *carnivore*, *omnivore*, *predator*, and *prey* correctly. She also records and reviews their “I wonder” questions, because she believes they should ask better questions at the end of an inquiry than at the start.

Charts document students' developing understanding and are assessed against the science standards about characteristics of organisms ("common features and needs of birds," in this case). The class chart shown in Figure 1.7 documents how living as ornithologists has changed these kindergartners and helped them grow.

The Gail Gibbons' books on birds (*Owls*, *Penguins!* and *Chicks & Chickens*) and other secondary sources read for information about birds also inform students' understanding of how information about birds can be communicated. As a culminating experience, Dori's students compose nonfiction books to showcase their expertise as young ornithologists as well as what they've learned about text features and text structures. They

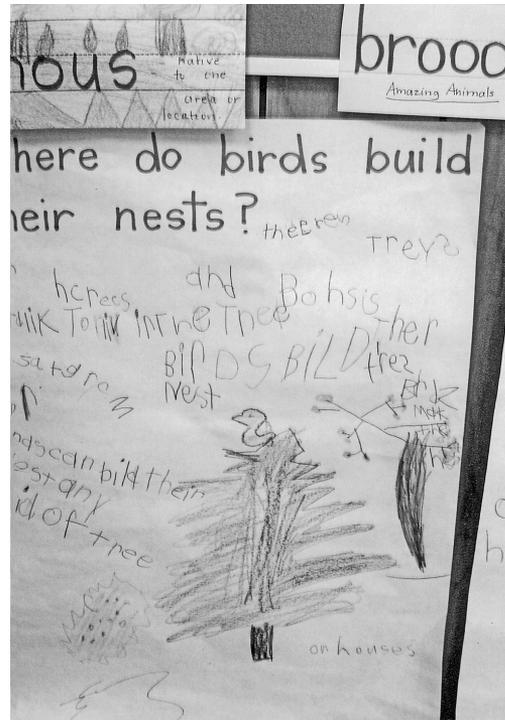


Figure 1.7

typically choose a bird they love or a topic like all the places birds can build nests. Figure 1.8 shows a page from a book on cardinals that uses the text features of an image and label to communicate six-year-old Andrew's expertise.

Dori's ornithology unit for kindergartners is grounded in planned learning engagements, practices that support her beliefs about teaching and learning (see Figure 1.9). More than interesting and engaging, the practices provide students the opportunity to live and learn as young ornithologists. Literacy, mathematics, and science standards are not taught or experienced in isolation, but exist as essential, collaborative skills and strategies. The universal processes of inquiry are grounded in the specifics of her unit.



Figure 1.8 Cardinals mate for life

Beliefs	Practices
Students need to learn how to observe birds carefully using the tools and strategies of ornithologists.	She created a bird observatory in her classroom.
Children need to learn how to pose and investigate questions from numerous perspectives.	<p>She helped her young birders learn how to pose questions after carefully analyzing bird nests.</p> <p>She had students read about and quantify the birds they observed at home and at school.</p>
Talk influences and reflects children's learning; they need to learn how to use the language of inquiry and of ornithologists.	She created a wondrous word wall to capture the language ornithologists use as demonstrated in daily read-alouds.
Scientists regularly access both primary and secondary sources when conducting formal and informal investigations.	She created a range of focused engagements using primary source data that helped her students learn how to make careful observations and interpretations.
Children need to be taught to do what scientists do.	She scaffolded students' learning to help them make observations and pose questions about what they noticed.
Scientists regularly reflect on their own learning as well as that of their colleagues. Reflection on content and processes or learning strategies promotes deeper learning and offers opportunities to teach and learn from one another.	She invited children to compose non-fiction books about birds and created class charts to show what they had learned about birds as a whole.
Children's talk during reflective conversations and responses to class questions offer honest, authentic assessment opportunities. We can find out what children have learned by paying careful attention to their formal and informal responses to class experiences.	She captured children's learning by documenting words and phrases they used when talking about birds.

Figure 1.9

🎥 **A Look Inside the Classroom:** Inquiry into Ornithology

IN VIDEO CLIP 1, you'll see what Dori's classroom demonstrations look, sound, and feel like (see www.heinemann.com/products/E04603.aspx). Dori's young birders learn to read, write, and sketch as they learn to use reading, writing, and sketching to share what they are learning as ornithologists.

As you envision how to make your content and literacy instruction better reflect authentic learning in the world, consider how the processes featured in Dori's classroom might work in your own classroom. The processes of inquiry are universal because they reflect authentic learning in the world, which makes them a natural part of any unit or content area at any grade level. For more examples to inspire you, and to see how young children learn to read and interpret nonfiction text features within the context of science workshop, go online. You will also find Dori's complete unit of study on ornithology online.

Online Teaching Resources



www.heinemann.com/products/E04603.aspx

Unit 1: Ornithology, Kindergarten

Narrative 1: Teaching Nonfiction Through Ornithology Inquiry, Kindergarten

Video Clip 1: Young Ornithologists Become Authors, Kindergarten

Video Clip 2 with Transcript: Ornithologists' Circle, Kindergarten

Meeting Standards, Giving Students Choice and Ownership: Grade 4 Weather Unit

Fourth-grade teacher Brenna Osborne knew she needed to develop a unit of study around weather in response to the Science Standards. She also knew she needed to focus on nonfiction during the year in response to the English Language Arts Standards. Although many elementary teachers might view these topics as separate yet equal, Brenna recognized how they could be connected and complementary.

She could realize the potential of both sets of standards more fully and offer her students choice and ownership by creating an embedded inquiry unit on weather and nonfiction.

Brenna created a series of invitations and engagements that helped her children learn to notice and name nonfiction text features and structures, and then learn how to apply them as writers by composing nonfiction books that reflected their personal interests and wonderings about one weather concept.

Brenna knew that if students learned to think, work, and communicate as meteorologists and climatologists, they would learn the concepts described by the standards more deeply and retain their understanding longer than if they simply learned the concepts outside of authentic context and application.

Weave the Language of Inquiry and Content Vocabulary into Instruction

In minilessons and reflective conversations to wrap up workshop, like you will hear in video clip 3, it was commonplace to hear Brenna say, “That’s the kind of observation a climatologist might make!” or “I wonder how a meteorologist might investigate that dilemma?” or “That surprised me. Do you think that information might help us explore climate change patterns over the past hundred years?” Because students incorporate their teacher’s language into their own, the classroom community soon began talking and posing questions like meteorologists and climatologists.

The More Children Know About a Topic, the Better Their Questions Become

Inquiry is cyclical: new learning leads to new questions. To help students develop the background knowledge they need to ask good questions, Brenna created a text-set of weather-related nonfiction books. In addition, her students checked out books from the library that related to their self-selected topics.

Brenna embedded independent reading into science workshop, where students explored diverse nonfiction sources such as picture books, content literature, textbooks, and magazines with articles about weather and climate. To conclude independent reading, Brenna invited her students to share noticings about content and text structures as well as text features that nonfiction authors use. They were constructing a foundational knowledge base from which they would pose questions to guide their individual inquiries into the weather or climate topic they found most intriguing.

Brenna made space during science workshop for her students to explore the books and select those that could best help them investigate their question(s). She invited her students to pose new questions based on their latest understandings several times before settling on a question to frame their own nonfiction books.

Reading for Content and Craft

Brenna taught her students how to look at texts from different perspectives when teaching the skillfulness of inquiry, both as scientists and as writers. Although that might seem complicated, it wasn't. Brenna taught them to read like writers during demonstration/minilessons. During the workshop phase, Brenna gave them time to read nonfiction independently. As they did, Brenna asked them to keep track of what they were learning about weather as well as nonfiction text structures and features. She consistently gathered the class together after independent reading to reflect on their noticings. Whole-class reflections offered systematic opportunities for all of the students to teach and learn from one another. Brenna often captured their reflective comments on charts to permanently record what they uncovered individually and collectively. These charts served as resources for mentor text examples and structures to inform students' creation of nonfiction texts (see Figure 1.10).

When reading like writers, the fourth graders noticed the following text structures:

- Descriptions: Main ideas with details
- Sequence: Information given in order
- Questions and Answers
- Compare and Contrast

They attended to text features such as:

- How authors use headers
- How mathematics is used regularly to teach content and to emphasize points
- How models and illustrations show or synthesize narrative content
- How references and glossaries are used frequently to guide readers

Figure 1.10

▶ A Look Inside the Classroom: Students Reflect on Nonfiction Text Structures and Features in Weather Books

WATCH VIDEO CLIP 3 of Brenna Osborne and her fourth graders sharing what they noticed and appreciated when they explored nonfiction texts related to their personal investigations about weather (see www.heinemann.com/products/E04603.aspx). You will see how Brenna intentionally taught thinking strategies within the context of this embedded inquiry. Reflect on the narrative of the online teaching demonstration to appreciate the depth and breadth of teaching and learning that occurred during this

reflective engagement. Brenna and her students uncovered a range of text structures and features to use in their own nonfiction weather and climate books.

SCIENTIFIC READERS AND WRITERS REFLECT ON NONFICTION TEXT STRUCTURES AND FEATURES IN WEATHER BOOKS

- Look at covers and inside of books to decide what text features or structures you want to use.
- Think about what nonfiction writers do to inspire us as we write our own nonfiction.
- Use glossaries to teach vocabulary your readers may not know.
- Compose leads with facts that will draw your reader in.
- Use your guiding questions to read for particular content information.
- Choose a text structure that best fits the kind of book you are trying to write; certain questions lend themselves to particular text structures.
- Use pictures and models to embed content information.
- Be sure facts are current by checking publication dates of nonfiction materials.

The reflective conversation you witnessed by eavesdropping in the classroom through the video clip illuminates the teaching and learning potential of embedded inquiries. It also reminds us of the integral relationship between our beliefs and practices. Figure 1.11 shows how Brenna brought her beliefs to life through deliberate actions and reactions.

Brenna's Beliefs	Her Practices
We should teach students to think, work, and communicate as meteorologists and climatologists instead of simply teaching them about weather and weather forecasting.	So Brenna wove the language of inquiry and the vocabulary that climatologists and meteorologists use into minilessons and reflective sharing sessions.
The more children know about a topic, the better their questions become.	So she offered students opportunities to pose questions about climate and weather over time before settling on a burning question to frame their nonfiction books.

Figure 1.11

continues

Brenna's Beliefs	Her Practices
Students need to explore diverse nonfiction sources to construct and share current, accurate information about their topics while investigating the range of text features and structures nonfiction authors use.	So she created an extensive text-set of nonfiction books around weather, and her students checked out books from the library that connected to their self-selected topics.
We should teach students how to look at texts from different perspectives when teaching the skillfulness of inquiry.	So she invited students to investigate the books as meteorologists and climatologists when focusing on content, and as writers when noticing and naming the text features and structures used.
A workshop model should include daily demonstrations, engagements, and reflection sessions to support writers and scientists.	So she taught them to read like nonfiction writers during science workshop.
Embedded teaching shows students how to read to learn in relation to their burning questions, while also keeping an eye on the ways their nonfiction texts were constructed.	So she charted what students noticed about nonfiction text structures and features in their weather books.
It is important for students to learn how to use guiding questions when reading to learn, and it is critical to help students understand that authors make deliberate decisions so that the form of the text best supports the content or message they want to convey.	So she taught them how to select a text structure that would best suit their guiding question(s) when composing their own nonfiction books.
Teachers should notice and name moves students make to validate individual authors, and they should inspire their young colleagues to be deliberate when deciding on the content and form of their work.	So she talked with her students writer-to-writer and scientist-to-scientist.
Teachers should work in front of, alongside, and behind their students, much like an apprenticeship model.	So she composed and published a nonfiction book on weather, in front of and alongside her students.

Figure 1.11 continued

To see what Brenna's beliefs and practices look, sound, and feel like in real life with real kids, go to the online teaching resources.

Online Teaching Resources



www.heinemann.com/products/E04603.aspx

Narrative 2: Teaching Nonfiction
Through Weather Inquiry, Grade 4

Video Clip 3 with Transcript: Students
Reflect on Nonfiction Text Structures
and Features, Grade 4