What's the Purpose? Students Talk about Writing in Science

Interviews with students reveal their views about purpose and audience in nonfiction writing.

Cathy Tower

Wolves were never mean creatures, but loving and caring; never blood thirsty, but neading meat to survive. Beautiful in the color of its fur, and as clever as me, wolves are communicating every day and adapting to their envirment to be successful. Wolves are amazing creatures. There is still much to learn about them.

In this closing paragraph of his wolf report, David, a fourth grader, demonstrates many of the nonfiction writing skills that we hope to foster in our students. In addition to a sophisticated sense of sentence structure, punctuation, and grammar, David has infused this writing

with his own voice. He employs adjectives and a simile, and he uses this final paragraph to put the closing note on an argument that he has developed in the paper—that wolves are amazing but often misunderstood animals that play an important role in nature. David is fortunate to be in a classroom with a teacher who provides him with lots of opportunities to practice his nonfiction writing.

As professional educators, how do we help our students to become proficient nonfiction writers? A growing body of work describes the potential of nonfiction genres to increase the literacy learning and development of a wide range of students (for a selected bibliography of this work, see the sidebar). Genre theorists, such as Freedman and Medway (1994) and Miller (1994), have helped us to understand the importance of writing with a specific audience in mind and of having a purpose for writing. Researchers have considered children's genre development in relation to their writing (Donovan, 2001; Kamberelis, 1999) and have begun describing the "intermediate steps" that children take on their way to nonfiction writing competence (Newkirk, 1987; Donovan, 2001). Scholars have contributed books and articles dedicated to helping teachers support their students' use and production of nonfiction texts (Bamford & Kristo, 1998; Duke & Bennett-Armistead, 2003; Duthie, 1996; Harvey, 1998; Hoyt, Mooney, & Parkes, 2003).

The professional literature on the teaching of writing frequently emphasizes a process approach, often through writers workshop (Atwell, 1987; Hindley, 1996). Given the growing concern with genre and with providing opportunities for students to learn genres, learn about genres, and learn through genres

(Chapman, 1999), the focus in writing instruction is shifting from a primarily personal narrative approach to approaches that incorporate opportunities for writing in a variety of genres (Bomer, 1995; Calkins, 1994; Lattimer, 2003). In addition, there is growing awareness of the importance of using genres (such as informational text) to explore the discourses of various content-area communities, including science (McLurkin, 2003).

As teachers of writing, we can help our students become proficient by learning about the theory, research, and practice behind genre development and children's developing knowledge and use of nonfiction genres in all areas. There is, however, one more important consideration. Little attention has yet been

In this article, I present data collected from 26 fourth graders in two classrooms in two schools in Michigan. The purpose of the interviews was to understand the sense students were making of the writing that they did during their science classes. The analysis of the interview transcripts revealed three important themes—their purposes for writing, the audiences for which that writing is intended, and the use of visuals (especially drawings and illustrations) for various purposes in a text. I also present data that was collected from teacher interviews and observations of science instruction so that readers may consider the ways in which the teachers and their instruction may have influenced students' ideas with regard to science writing. It is not my inten-

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paid in the research literature to the reasons that students have for writing—their purposes, their perceived audiences, and the ways in which they interpret the reasons for writing in their classrooms. The time has come to turn our attention to students as they struggle to become active members of discourse communities that strive to make meaning through written nonfiction texts. If we understand the ideas that students bring (and/or the ideas that they glean during instruction) about purpose, audience, the use of visuals, and other genre and discourse-related concerns, then we can use this understanding to support our students' writing development. We can also use this information to assess our curriculum, our teaching, and the messages we send to our students about the purposes for writing in science.

tion to compare and contrast the two classrooms in order to evaluate them or to draw cause and effect conclusions. Instead, I present these two classrooms and these 26 children as descriptive cases to understand students' thinking about genre-related issues, and, in turn, how we might use this understanding to help us improve our writing instruction.

THE CLASSROOM WRITING CONTEXT

The interview data was collected in two fourth-grade science classrooms in separate schools in Michigan, Rose Elementary and Laurel Elementary. At Rose Elementary, Mrs. Burke focused both on science content instruction and on writing instruction within science class. In an interview, she explained that her

focus on writing instruction throughout her curriculum was largely on informational and other nonfiction genres:

I don't write a lot of stories. I tend to write more factual, informational type, because I think that in reality that's what they're going to do more of in life. If they want to write, and they want to write creatively, that's fine, they can do that at different times. But for the most part, we focus on informational writing with a structure to it because they're so weak in that.

Mrs. Burke integrated writing instruction into science, emphasizing writer's craft and attention to language. The writing tasks or "reports" were extended pieces of writing on a topic related to their studies of science content. There was an emphasis on the writing process, with students required to use prewriting tools, take notes, and complete multiple drafts. The writing was intended to help students build science knowledge and to become better writers of "factual" texts.

At Laurel Elementary, Mrs. Moore's science curriculum was based heavily on experiments, with an emphasis on hands-on experiences. The writing she assigned came in various types, including free-writing, textbook summaries, and books (both class books to which each student contributed a page, and individual books that were created by a single student). There was an emphasis on recording data related to experiments and on demonstrating content knowledge through writing. For example, Mrs. Moore used the textbook summaries as a way to check students' understanding of key science concepts. Students' individual books were used as end-of-unit assessments. As this excerpt from an interview with Mrs. Moore

suggests, her focus seemed to be on writing as a tool for remembering and for learning:

I'll probably try to do a book like that every unit we do. Hopefully they will get better at remembering information. I think maybe we're gonna have to have them take notes on their own, I think that might be a way to do it is to make summaries. And I do need to work on summarizing. . . . And hopefully they can do that with their notes in science too, they'd be able to say, well let's go through the important things and make a list that's real generic, you know kind of thing. Then they could write from that. That would help them remember the topics.

Thus, Mrs. Moore expected that students' writing supported their un-

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derstanding of the experiments and science concepts, as well as helped them retain this knowledge.

Overall, students in both of these classrooms did a significant amount of writing in science over the course of the school year. At Rose Elementary, students completed seven major writing assignments in science, the majority of which were several pages long. These assignments included a wolf report, an owl report, a report about matter, and a newspaper about natural disasters. At Laurel Elementary, students completed eleven nonfiction writing assignments in science that varied in length from a paragraph or two to several pages. These assignments included textbook summaries of electricity and energy,

animal reports, and magnetism and electricity books.

In our open-ended, one-on-one interviews, students talked about their writing in science class. At each interview, I had copies of recently completed and/or in-progress writing assignments in front of me while I talked to the students so that I could refer to specific aspects of their work. Analysis of interview transcripts revealed themes across students related to the issues of purpose, audience, and use of visuals.

"So We Can Maybe Tell Somebody": Purposes for Writing

The students varied in their ability to talk about purposes for their writing in science. When asked why they had done a particular writing task, some students said they didn't know, or just looked at me and shrugged. Others were able to offer one or more reasons for the writing. In order to write effectively, an author needs a sense of the purpose for which they are composing a particular text. Genre theorists have discussed ideas that can help teachers orient students to the importance of rhetorical concerns such as purpose.

Genres have come to be defined not simply as categories or classes of texts (science fiction, biography, story), but as patterns of rhetorical action that serve communicative purposes within particular discourse communities (Miller, 1994). That is to say that genres represent patterns in language use that serve to guide people's participation within particular groups. Miller (1984) argues that "for the student, genres serve as keys to understanding how to participate in the actions of a community" (p. 165). Thus, we must help our students to learn the particular ways of conveying ideas, supporting

hypotheses, presenting arguments, asking questions, and so on that will help them to be successful in contexts both in and out of school.

Outside of school, writers typically compose texts to fulfill some communicative purpose. Some writers keep diaries in which they record their personal thoughts and reflections or the events of their lives. Others write letters or e-mails to communicate business or to maintain personal relationships. Still others write books and articles so that they may communicate knowledge and ideas to others. All of these examples constitute "authentic" literacy events that have authentic purposes (Duke, Purcell-Gates, Tower, & Hall, 2001). In school, however, students often write because their teacher tells them to write. They aren't given the opportunity to consider the various purposes for writing. Research suggests that it is important for students to be provided with authentic purposes for writing during the school day (Purcell-Gates, Duke, Hall, & Tower, 2003). Understanding that there are multiple purposes for writing helps students learn the ways they can communicate effectively within different contexts and situations. Students need opportunities to experience the different purposes for which scientists write as well as the ways people conduct scientific discourse.

The interview data suggests that the purposes students reported for their writing in science class closely mirrored the purposes their teachers expressed during instruction and during the assigned writing tasks. At Rose Elementary, where the teacher focused instruction on both science content and the improvement of writing, students indicated several purposes for their science writing, including improving their writing skills, learning about science topics, telling others about a science topic, practicing their typing skills, and having fun. At Laurel Elementary, where the emphasis was largely content-oriented, the students indicated purposes that included writing as a way to help them remember things, record data, explain an experiment, learn and better understand science topics, demonstrate accountability to the teacher, and prepare them for the future.

Improving Writing Skills and Preparing for the Future

At Rose Elementary, Mrs. Burke emphasized the importance of improving writing skills. In her interview, she said:

So when we studied the wolves, rather than just reading, we were reading for a purpose, and that purpose was that we could finish a good wolf report. And they know what it means to be a good writer. And we've talked about why you want to do well in all subjects, not just in writing, you know, it's going to benefit you, in the long run, to be a good learner with good habits, and no matter what you do you want to do your best, we've talked about all those kinds of things. And why it's important to do your best.

This emphasis on learning to be a good writer because you'll need those skills later in school was clearly reflected in Charlie's response to the question of purpose:

Cathy: *You've done owls, and matter, and . . . why do you think she has you write all those reports?*

Charlie: *So we can, so we can know about matter and all that. And to learn how to actually make a report. . . . When you go to college and high school, you have to write bigger things.*

Another student, David, commented on why he believed they did science writing, "To build our writing skills and stuff like that." So, according to David, Charlie, and Mrs. Burke, one purpose for writing in science in this classroom is to build the writing skills necessary to be successful in later schooling.

At Laurel Elementary, two students indicated that writing serves the purpose of helping to prepare you for the future. Sarah stated that her teacher wanted her to explain ideas

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in writing because "we need to learn how it works, and, it's for next year, and, like, when we get married and stuff we need to know to like repair light bulbs and repair wires." Renee thought the purpose for writing textbook summaries was "to help us learn more, to help us get more ready for fifth grade."

Learning and Remembering Science Content

Students at both schools expressed a belief that the writing they did was meant to help them learn about science. At Rose Elementary, three students expressed that the purpose of writing was to help them learn. Jimmy described the purpose of one of his writing assignments, a newspaper about natural disasters, as "to learn about what's happening in the world." When I asked Charlie about his natural disasters newspaper, he

stated that a purpose for writing was to learn about the world. "Ah, we're writing about natural disasters, and like tornadoes, fires, hurricanes, and we're writing it because we need to know what happened in it."

At Laurel Elementary, where the teacher's purposes for writing were closely tied to the experiment-based curriculum, 11 of the 13 students interviewed said they wrote in science to help them learn and understand science concepts. Eight students said one purpose of writing was to help them remember things. Students who said that writing helps them learn about science commented:

Janie: *It helps us understand what happened [in the experiment] and what we learned.*

Matthew: *Well, it helps us learn more about electricity and, um, protons, um, electricity [pause] and electricity.*

Jason: *Mm, it helps you think about it, and it helps you learn more and understand it more.*

Students who indicated that writing helped them to remember commented:

Chris: *Um, it helps us because, if she just told us, you could easily forget, but if you have a paper you can easily look back and remember it all.*

Mary: *When we read like interesting stuff, we write about it and then I read it, I forget, and then when I read my papers it actually reminds me of what I learned, and stuff.*

Matthew: *Well, it helps us remember how we do it and um, where we did it and how long it took and how far or what happened. So usually it helps us remember.*

Being Accountable to the Teacher

Three students at Laurel Elementary proposed that writing was one way to prove that you had learned what you were supposed to learn, to prove you were paying attention, and/or to show that you were doing your own work.

Laura: *Well, what she does is we read in our textbook, a paragraph, and then at the end she doesn't let us look in the book and we have to write down what we learned from the paragraph.*

Cathy: *Why do you think she asks you to do that?*

Laura: *Well, um, to see if we were paying attention. . . . the text writing is just like a quiz that we can just write up for our teacher.*

Laura clearly saw the textbook summary assignments as having an accountability purpose. Wes concurred:

Wes: *Um, so that she knows you are actually reading, you aren't just looking through the book.*

Marie saw an accountability purpose for all of the writing that she did in science:

Cathy: *Okay. Why do you think Mrs. Moore wants you to write about your science experiments?*

Marie: *So we, so she knows that we were really doing the science experiment, and that we didn't make our parents do it or something.*

Cathy: *And what about when she asks you to like read the textbook and write about that, or write what you learned?*

Marie: *So that we were paying attention and not like fooling around.*

Other Purposes

In addition to helping to improve writing skills, learn science, and be accountable to the teacher, students reported that writing allowed them to explain an experiment they had conducted, record data during experiments, and practice their typing skills. Interestingly, there were four students at Rose Elementary who reported that they didn't know why they had completed some writing assignments or why their teacher had asked them to do so.

As the data suggests, students are capable of understanding a variety of purposes for writing. The purposes that students expressed were often related to the purposes their teachers presented, either through their instructional talk or through the writing tasks they assigned. As teachers who are informed about genre theory and students' genre development, we can think about ways to provide our students with authentic purposes for writing, including consideration of audience. One thing we can do is to be explicit about various writing purposes related to our assignments, as this could help students understand how to participate in various contexts and discourse communities. We need to understand that our assignments and projects send messages to students about the purposes for which people write. If students see writing as only serving to hold them accountable to their teacher, for example, they may come to dislike writing or to have a narrow view of its possibilities. Writing serves a variety of purposes for people in different social and cultural communities. Within science, people write for many reasons, such as to record data, report findings of experiments, inform others about science topics, and persuade others of the plausibility of their hypotheses. With this understanding, we

Selected Resources on the Benefits and Uses of Nonfiction Genres

Nonfiction and Young Readers

Duke, N. K., & Bennett-Armistead, V. S. (2003). *Reading & writing informational text in the primary grades: Research-based practices.* New York: Scholastic.

Duke, N. K., & Kays, J. (1998). "Can I say 'Once upon a time'?": Kindergarten children developing knowledge of information book language. *Early Childhood Research Quarterly, 13,* 295–318.

Duke, N. K., & Tower, C. (2004). Nonfiction texts for young readers. In D. Schallert & J. Hoffman (Eds.), *The texts in elementary classrooms* (pp. 125–144). Mahwah, NJ: Erlbaum.

Maduram, I. (2000). "Playing possum": A young child's responses to information books. *Language Arts, 77,* 391–397.

Tower, C. (2002). "It's a snake you guys!": The power of text characteristics on children's responses to information books. *Research in the Teaching of English, 37,* 55–88.

Nonfiction as an Entree into Literacy

Caswell, L. J., & Duke, N. K. (1998). Non-narrative as a catalyst for literacy development. *Language Arts, 75,* 108–117.

Hynes, M. (2000). "I read for facts": Nonfiction in a fictional world. *Language Arts, 77,* 485–495.

Jobe, R., & Dayton-Sakari, M. (2002). *Info-kids: How to use nonfiction to turn reluctant readers into enthusiastic learners.* Markham, Ontario: Pembroke.

Writing Nonfiction

Chapman, M. L. (1994). The emergence of genres: Some findings from an examination of first-grade writing. *Written Communication, 11,* 348–380.

Donovan, C. A. (2001). Children's development and control of written story and informational genres: Insights from one elementary school. *Research in the Teaching of English, 35,* 394–447.

Newkirk, T. (1989). *More than stories: The range of children's writing.* Portsmouth, NH: Heinemann.

Tower, C. (2003). Genre development and elementary students' informational writing: A review of the literature. *Reading Research and Instruction, 42*(4), 14–39.

Using Nonfiction in Inquiry Curricula

Harvey, S. (1998). *Nonfiction matters: Reading, writing, and research in grades 3–8.* York, ME: Stenhouse.

Tower, C. (2000). Questions that matter: Preparing elementary students for the inquiry process. *The Reading Teacher, 53,* 550–557.

Selection and Incorporation of Nonfiction into the Curriculum

Bamford, R. A., & Kristo, J. V. (1998). *Making facts come alive: Choosing quality nonfiction literature K–8.* Norwood, MA: Christopher Gordon.

Duthie, C. (1996). *True stories: Nonfiction literacy in the primary classroom.* York, ME: Stenhouse.

Hoyt, L., Mooney, M., & Parkes, B. (2003). *Exploring informational texts: From theory into practice.* Portsmouth, NH: Heinemann.

Kristo, J. V., & Bamford, R A. (2004). *Nonfiction in focus.* New York: Scholastic.

Using Nonfiction in Read Aloud

Doiron, R. (1994). Using nonfiction in a read-aloud program: Letting the facts speak for themselves. *The Reading Teacher, 47,* 616–624.

Moss, B. (1995). Using children's nonfiction tradebooks as read-alouds. *Language Arts, 72,* 122–129.

Oyler, C., & Barry, A. (1996). Intertextual connections in read-alouds of information books. *Language Arts, 73,* 324–329.

Reese, D. A., & Harris, V. J. (1997). "Look at this nest!" The beauty and power of using informational books with young children. *Early Child Development and Care, 127/128,* 217–231.

—Cathy Tower

provide students with opportunities to write for the same reasons that scientists write.

"I Was Thinking about It for the Reader": Audiences for Writing

Another important writing consideration that arose from interviews with students is audience. Audience is an important aspect of both the social context and the cognitive processes of writers (Hayes, 2000; Wollman-Bonilla, 2001). Since writing is a social process widely used to communicate, developing audience awareness is central to literacy learning (Wollman-Bonilla, 2001). Young writers must learn to consider their audience if they are to compose texts that effectively convey their messages. As adult writers familiar with genre theory, we understand intuitively that all writing is intended for a specific audience, even if that audience is limited to the writer herself. In my interviews, students could not always identify an intended audience for a particular text they had written. Thus, it is important for us as teachers to discuss audience with our students, and to work to understand their conceptions of audience for the texts they compose in school.

In talking about their science writing, the majority of the students reported that the audience for their writing consisted of their teacher (usually for grading purposes), their classmates (usually for peer editing purposes), and/or their families. At Laurel Elementary, those were the only reported audiences. At Rose Elementary, students reported a few additional audiences. Michelle mentioned her babysitters, and Jimmy and Peter thought that the teacher would put their work in the hallway for passersbys to read. Ella said that

she would read her wolf report to people who attended her school's author's day. These reported audiences, while important, don't extend very far beyond the classroom and have a limited focus on writing as a way to display knowledge to a teacher or other already knowledgeable audience. Other scholars have suggested ways in which teachers can provide students with more authentic audiences for their writing (Purcell-Gates et al., 2003, Tower, 2000). For example, as part of an inquiry curriculum, teachers can have students e-mail experts with questions on their topic, and they can help students to identify appropriate audiences for which they can write up their research findings. Students can write information books or posters for younger stu-

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dents who need or want to learn about a particular topic. Teachers can help students to fill community needs through writing, by providing informational brochures at a nature center or writing weather reports to be read over the school intercom. There are lots of possible ways for teachers to help students become aware of real audiences for their writing. In turn, writing for real audiences gives students authentic purposes for writing.

In addition to writing for real audiences, my work with students at Rose Elementary suggested the potential benefits of writing for a more generic, hypothetical audience that they (and their teacher) referred to as "the reader." Mrs. Burke's

emphasis on writing instruction and writer's craft during science included lessons on techniques such as "hooking the reader" with an interesting lead, using figurative language such as similes and onomatopoeia, and varying word choice and sentence structure. Mrs. Burke often referred to "the reader" as she tried to help her students make their writing more effective and interesting.

This consideration of a generic "reader" was reflected in the writing and the talk of several students at Rose Elementary. Many students directly addressed their readers through the use of "you" in questions and statements. For example, students asked, "Did you know that there are 109 elements?" and "Can you believe their noses are big enough to hold two million smelling cells?" Their interviews revealed serious consideration of "the reader" and ways to accommodate him/her by making their writing interesting and comprehensible. The following excerpt from John's interview is an example of how students considered the needs of "the reader" as they wrote:

Cathy: *How did you make decisions about starting out your sections?*

John: *Well, she [Mrs. Burke] said to not just do "Wolves, blah blah, blah blah" and all that stuff, really boring, but to do something interesting.*

Cathy: *And why do you think it's important to Mrs. Burke, or*

that it's important that it be interesting?

John: *Because then the reader doesn't just read a couple sentences and then they go "Well, that's pretty boring, I'm not reading that." [laughs]*

Cathy: *[laughs] So you want to keep someone's, the reader's attention.*

John: *Yes.*

Cathy: *Okay. And then it does sound like you're talking to somebody when you say that. You say "Do you know . . . ?" Were you thinking about somebody when you were writing?*

John: *No, I just, that's usually just how I write. Like I'm talking to somebody.*

Cathy: *And why do you think you do that?*

John: *Um, probably because that's pretty interesting. 'Cause it's not just giving information. It's, I don't know how [unintelligible]. Um, it wouldn't be just like supplying information. You'd be actually telling them, it would be like you were saying that in person.*

Thus, "the reader" allowed John to envision an audience as he wrote, and to consider that his writing needed to be interesting and engaging for that audience.

"The reader" also posed a challenge to these students by setting a standard that the writers must meet. The writers had to make the writing interesting enough to capture and hold "the reader's" attention. This forced an attention to language and organization that may have resulted in better writing. Of the students who talked about "the reader," some had actual people (or at least categories of actual people) in mind to attach to the concept, but others did not. William connected his hypothetical reader to actual (though very general) audiences:

Cathy: *I was interested in how you decided to start this. You said "Howwwl, howwwl, that's what a wolf sounds like."*

William: *To get their attention.*

Cathy: *To get whose attention?*

William: *The reader's.*

Cathy: *Oh, okay. And why do you want to get the reader's attention?*

William: *To make it not be boring.*

Cathy: *Okay. And so, and the reader is . . .*

William: *Anybody.*

Cathy: *Anybody?*

William: *Friends, family, their friends.*

However, not all students had an explicit sense of who "the reader" was. Peter wasn't able to connect his generic "reader" to a real audience that would read his work:

Cathy: *. . . it sounded a little bit like you were talking to somebody, like when you asked this question, "Did you know . . . ?" were you thinking about somebody when you were writing?*

Peter: *Yes.*

Cathy: *Who were you thinking about?*

Peter: *I'm not sure. I was just thinking of somebody. I didn't really think about who I was thinking of.*

This sense of "the reader" seemed to provide some benefits to these students as writers. It gave them an impetus to carefully consider the choices they made as they composed their nonfiction texts. Their efforts to sustain "the reader's" attention, to "hook the reader" resulted in writing reflective of authors who consider issues of craft. As teachers, we want to encourage our students to attend to issues of craft and the needs of an audience. This idea of "the reader" is one way to help them do that.

Though the concept of "the reader" seemed to help many students with their writing, I was left with questions about focusing on a hypothetical audience. Might it be better for students to have actual, concrete audiences for their work? A real, known audience could serve as a more powerful tool in helping students shape a message. Perhaps "the reader" could be a starting point, with the teacher moving out from that abstraction and helping students think of real people who will be reading the text. Certainly, if it is difficult or impossible to provide students with real audiences outside the classroom, then "the reader" could serve an important role in helping students to consider audience anyway. Future work needs to be done to further explore children's understanding and attention to audience. The data reported here suggests that an examination of the benefits and shortcomings of an abstract "reader" as audience is needed in further studies.

"I Just Drew a Picture That Went Along with It": The Use of Visuals

The third theme that arose in my interviews with students surrounded their use of visuals. Issues of purpose and audience are intimately tied to the use of visuals. Writers of nonfiction text need to consider the potential of visuals to

enhance their message and make their ideas more accessible to readers. Steve Moline (1995) makes a compelling case for the power and potential of visuals to enhance comprehension and access to information and literacy. He argues that readers of nonfiction texts (especially informational texts) often read selectively, and that how they read a text depends on their purpose for a given reading. He states that we need to help students keep the selective reading purposes of their readers in mind as they write informational texts. This has implications for the organization and layout of a text, as well as for the selection and presentation of visuals to be included in that piece. It also has implications for the ways in which teachers think about drawing and its relationship to writing. Moline (1995) states:

> Since a significant part of an integrated text lies in its visual elements, [the] ability to draw is as important as [the] ability to write. Drawing can sometimes be neglected or treated as an add-on reward or afterthought in the classroom. Even in classrooms where there are many opportunities to draw there is sometimes the assumption that in the end drawing is not really as important (as useful, as serious) as writing. (p. 15)

Though the use of visuals among the students in this group was often thoughtful and interesting in the ways it served to extend the text, there was the overarching sense that illustrations and other visual elements were "add-ons" that came only after the writing was completed. Of the 26 students interviewed, all but one reported that they did their writing first, and then added illustrations afterwards if time permitted. At each school, there was at least one student who

was explicit in his or her statement that writing was more important, or more valued, than drawing in their classroom. At Rose Elementary, Rick reported that he and his classmates were required to write before they drew:

Cathy: *Did you do the pictures first or the writing first?*

Rick: *You did the writing first, I did the writing first. You're supposed to or you get in big trouble with Mrs. Burke.*

Cathy: *You get in big trouble if you don't do the writing first?*

Rick: *Yeah. 'Cause she wants you to do the report and stuff first.*

Cathy: *Oh, okay. So the writing is more important than the pictures?*

Rick: *Yes.*

Many students at both schools reported that they did the writing first, then they went back and reread what they had written and thought of a drawing to accompany it. Peter (from Rose Elementary) explained it this way: "What I did is I wrote it, I read it, found something interesting in it that I thought of, and then I drew a picture of the interesting thing."

One student at Rose Elementary, Allie, indicated in her interview that she did the drawings first. Her composing process seems to be different than the linear process described by other students who write the text and then think of a picture to go with it. This revelation about her use of drawings came in the part of our conversation where we were discussing her use of leads, and how she decided to start the various sections of her wolf report.

Cathy: *Okay. So, you don't want to tell them everything you*

know right at the start? Is that what you mean?

Allie: *Mm hm.*

Cathy: *Okay. And so, if you're not wanting to tell them everything you know, what do you think you are doing at the beginning instead?*

Allie: *Um, you're just kind of saying, just what wolves mainly do, but then at the end you tell 'em, like the whole fact of how it started, of how the wolves, um, like, well on this page right here . . . see, this is when they're howling at the moon, but you say, like, [small sigh] hmm. You just can . . . I don't know how to explain it. Like, you just say of what they're doing, 'cause I drew the pictures first 'cause I knew what I was going to write about.*

Cathy: *Oh, you drew the picture first.*

Allie: *Mm hm.*

Cathy: *Before you wrote? Okay.*

Allie: **So, once I drew the picture, I thought, like, you should write just a little bit of what they're doing in the picture, and then you get more into it of what they're not doing in the picture.**

Cathy: *That's very interesting. So is that true on all the pages? You did all the pictures first, and then you did the writing? And sometimes the pictures helped you to think about what you were going to write?*

Allie: *Mm hm.*

Allie's comments reveal a composing pattern that didn't necessarily fit well with the requirement that students save their drawing until after the writing is done. Her comments (particularly her boldfaced

comment above) suggest that perhaps drawing can play an important role in the composing process, that for some students, drawing helps in the organization and expression of ideas in written form.

One student used visuals to extend his written nonfiction text, adding humor and enhancing the comprehension of his readers. An earlier study I conducted (Tower, 2002) indicated the power of visual features in information texts on the responses to those texts by preschool students. My research and teaching experience indicate to me that visual elements of nonfiction texts play a vital role, and that children need to be readers and writers who can appreciate and comprehend these elements and use them effectively.

CONCLUSION

To help students become better writers of science texts, teachers who are savvy about genre development understand the need to pay attention not just to issues of mechanics and assessment, but also to issues of purpose, audience, and the use of visuals. These understandings will enable students to become more effective writers who can participate fully and powerfully in a variety of discourse communities. As the data suggests, students' views of these issues, while varied, seem to reflect the instruction and writing tasks provided by their teachers. Thus, as teachers, we have an opportunity and a responsibility to offer students a variety of models of texts written for different audiences and purposes, as well as a range of opportunities to practice writing in varying contexts.

There are many ways in which teachers can incorporate authentic purposes, audiences, and reasons to use visuals into their science instruction. Inquiry curriculum that

focuses on students' questions is one powerful way to do this and leads to the authentic use of many different genres and types of texts and visuals (Tower, 2000). When students are passionate about a topic, when they learn about something in great detail, ask intriguing questions, and spend time trying to answer them, students have authentic and compelling reasons to read and write.

- Students may wonder why there are nine planets in our solar system. Who gets to decide what counts as a planet? What are the criteria? As a part of their research, they might write letters or e-mails to NASA scientists. They might write a book that explains the process of identifying and naming planets to be shared with others through the classroom library or through a space-related Web site.

- Students might feel that their town (or school) needs a recycling program; they could write a letter to the editor of the local paper (or the school paper), and then produce a pamphlet with persuasive text that argues for recycling or add a procedural text that explains how to start a recycling program.

- Students may visit a nature center or a museum or a planetarium on a field trip, and upon returning to school, they may decide that the place visited didn't offer enough informational text written for kids. They could work in conjunction with someone at the trip destination to create a pamphlet or some posters

to be displayed for future young visitors.

- Students in a higher grade may receive a request from the teacher of a lower grade for information books on a particular topic. This teacher may explain that she is having difficulty locating enough interesting texts for her students, and she would appreciate it if the class would produce some appropriate materials. Then students could research and write books with visuals that are appropriate for the intended audience.

Each of these examples includes an authentic purpose for writing that students might identify with, and each includes a real audience for whom the text is produced. The pos-

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sibilities for such authentic writing experiences are limited only by the imagination of students and teachers. Research and theory point toward the power and potential of authentic literacy experiences for students in order that they might learn to participate effectively in a variety of discourses. Such authentic experiences will necessarily include children's voices. Students can and do think carefully about rhetorical and generic issues such as audience and purpose. Let's take up the challenge of presenting students with opportunities to expand their repertoire of writing purposes, audiences, and contexts.

Author's Note:

Authors Who Specialize in Books about Science

The following authors write about a range of topics related to science. Their books can be shared as author studies, sources of information on specific topics, or models of writing.

Caroline Arnold concentrates on individual animals and fossils. Her writing is distinguished by lucid details and readable information arranged in a well-organized presentation, usually enhanced with photographs.

Jim Arnosky specializes in books about nature with careful observations noted in both text and illustrations. He has simple picture books that focus on a specific animal and a series of guided tours through nature by a fictional character, Crinkleroot. His detailed drawings augment the text and provide true-to-life portraits from nature.

Melvin Berger gives basic explanations about a variety of topics in simple but effective language. Many of his books are part of the "Let's Read and Find Out" Series, and the Scholastic "Questions and Answers" Series.

Gail Gibbons has written numerous books that each focus on a different topic. Her writing is precise with clear explanations and she uses bright, colorful illustrations to extend the text. Her books could be used as models to illustrate different text features.

Brenda Guiberson crafts well-researched information into narratives with a story-like tone. Her books focus on specific animals and ecosystems.

Kathryn Lasky is a prolific author whose books span many genres. Those that focus on science topics feature books about animals, ecosystems, and the biographies of scientists. Her readable prose is filled with fascinating details.

Patricia Lauber fills her books on diverse topics with specific details and facts that are in-depth and entertaining. Many of her books are part of the series, "Let's Read and Find Out."

Sandra Markle usually focuses on books about specific birds and animals. Many of her books are part of the "Outside and Inside" series and feature photo-essays succinctly written with fascinating details and information.

Mary Pope Osborne provides in-depth information about science topics through *The Magic Tree House Research Guides.* The Guides accompany her Magic Tree House stories, some of which focus on science topics.

Laurence Pringle is a master at vividly describing the topics explored in his numerous books. His writing incorporates the most recent research in clearly written text. Check out his books in the series, "Strange and Wonderful."

Seymour Simon writes about a wide range of topics, including weather, the solar system, the human body, and animals. His narratives are distinguished by clear descriptions and an orderly presentation and are illustrated with full-color photographs. Also, see his series of novels on the science detective, Einstein Anderson.

Gloria Skurzynski is an author of both novels and nonfiction that focus on science, including her series *Mysteries in Our National Parks,* which combines science facts with exciting plots. Her information books are packed with easy-to-understand explanations about scientific principles.

—**Marilyn Carpenter**

References

Atwell, N. (1987). *In the middle: Writing, reading, and learning with adolescents.* Portsmouth, NH: Heinemann.

Bamford, R. A., & Kristo, J. V. (1998). *Making facts come alive: Choosing quality nonfiction literature K–8.* Norwood, MA: Christopher Gordon.

Bomer, R. (1995). *Time for meaning: Crafting literate lives in middle & high school.* Portsmouth, NH: Heinemann.

Calkins, L. M. (1994). *The art of teaching writing.* Portsmouth, NH: Heinemann.

Chapman, M. L. (1999). Situated, social, active: Rewriting genre in the elementary classroom. *Written Communication, 16,* 469–490.

Donovan, C. A. (2001). Children's development and control of written story and informational genres: Insights from one elementary school. *Research in the Teaching of English, 35,* 394–447.

Duke, N. K., & Bennett-Armistead, V. S. (2003). *Reading & writing informational text in the primary grades: Research-based practices.* New York: Scholastic.

Duke, N. K., Purcell-Gates, V., Tower, C., & Hall, L. (2001). *Written information genre knowledge and acquisition in second-grade science.* Paper presented at the National Reading Conference, San Antonio, TX.

Duthie, C. (1996). *True stories: Nonfiction literacy in the primary classroom.* York, ME: Stenhouse.

Freedman, A., & Medway, P. (1994). *Genre and the new rhetoric.* Bristol, PA: Taylor & Francis.

Harvey, S. (1998). *Nonfiction matters: Reading, writing, and research in grades 3–8.* York, ME: Stenhouse.

Hayes, J. R. (2000). A new framework for understanding cognition and affect in writing. In R. Indrisano & J. R. Squire (Eds.), *Perspectives on writing: Research, theory and practice* (pp. 6–44). Newark, DE: International Reading Association.

Hindley, J. (1996). *In the company of children.* York, ME: Stenhouse.

Hoyt, L., Mooney, M., & Parkes, B. (2003). *Exploring informational texts: From theory into practice.* Portsmouth, NH: Heinemann.

Kamberelis, G. (1999). Genre development and learning: Children writing stories, science reports and poems. *Research in the Teaching of English, 33,* 403–460.

Lattimer, H. (2003). *Thinking through genre: Units of study in reading and writing workshops 4–12.* York, ME: Stenhouse.

McLurkin, D. (2003). Writing: Teaching children to compose informational text. In N. K. Duke & V. S. Bennett-Armistead (Eds.), *Reading & writing informational text in the primary grades: Research-based practices* (pp. 127–151). New York: Scholastic.

Miller, C. R. (1984). Genre as social action. *Quarterly Journal of Speech, 70,* 151–157.

Miller, C. R. (1994). Rhetorical community: The cultural basis of genre. In A. Freedman & P. Medway (Eds.), *Genre and the new rhetoric* (pp. 67–78). Bristol, PA: Taylor & Francis.

Moline, S. (1995). *I see what you mean: Children at work with visual information.* York, ME: Stenhouse.

Newkirk, T. (1987). The non-narrative writing of young children. *Research in the Teaching of English, 21,* 121–144.

Purcell-Gates, V., Duke, N. K., Hall, L., & Tower, C. (2003). *Explicit explanation of genre within authentic literacy activities in science: Does it facilitate development and achievement?* Paper presented at the National Reading Conference, Scottsdale, AZ.

Tower, C. (2000). Questions that matter: Preparing elementary students for the inquiry process. *The Reading Teacher, 53,* 550–556.

Tower, C. (2002). "It's a snake you guys!": The power of text characteristics on children's responses to information books. *Research in the Teaching of English, 37,* 55–88.

Wollman-Bonilla, J. E. (2001). Can first-grade writers demonstrate audience awareness? *Reading Research Quarterly, 36,* 184–201.

Author Biography

Cathy Tower *is currently visiting assistant professor of Literacy in the Department of Curriculum and Instruction at the University of Toledo.*

CHILDREN'S LITERATURE INSTITUTE

Children's Literature New England's nineteenth annual institute, "The Fairy Tale Belongs to the Poor," will be held at Radcliffe Institute for Advanced Study, Harvard University, in Cambridge, Massachusetts, on August 7–13, 2005. The institute will consider whether classic fairy tales promote impossible achievement and false hopes or are valuable parables for the young, as well as what they bequeath to such descendants as Pippi Longstocking and Harry Potter. Speakers include Elizabeth Bicknell, Susan Cooper, Sarah Ellis, Neil Gaiman, Betsy Hearne, Donna Jo Napoli, Elizabeth Partridge, Jacqueline Woodson, and Paul Zelinsky. For more information, see www.CLNE.org or call or e-mail registrar Martha Walke (802-765-4935; walkem@sover.net).