

Sara Moore and Bill Bintz have an extensive collection of award-winning children's books for use in their current project, but both agree on what they call their "mantra": "We're not about collecting books. We're about connecting books to meaningful curriculum."



WRITTEN BY
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The kids in the children's section at Joseph-Beth Booksellers in Lexington must wonder about Bill Bintz and Sara Moore. The two UK College of Education professors can be found there often, excitedly passing new books back and forth and piling up the "gotta haves."

"Sara, have a look at *One Woolly Wombat!* This might go along nicely with *Bat Jamboree*—see what you think."

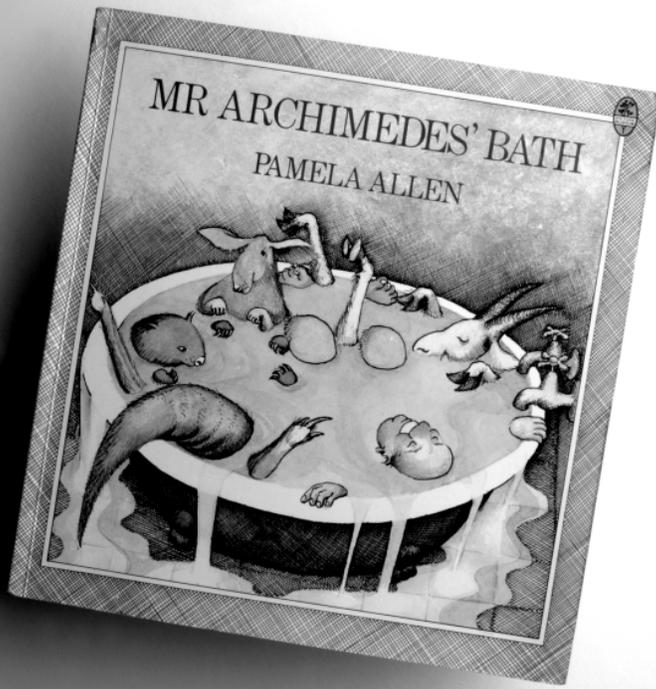
"Great! And take a look at this one, Bill—*Counting Crocodiles*. Maybe a companion to *One Cow Laughing?*"

But for the "biggest kids in children's books," as Bintz refers to the two of them, it's all in a day's work.

"When Bill and I go to a conference, we're all over any used bookstores we can find," says Moore, who holds a Ph.D. in gifted education from the University of Virginia. "He's looking for engaging narratives, and I'm focusing on how accurate the math and science are."

Such fieldwork is the basis for a collaborative project designed to support teachers in learning to use high-quality and award-winning children's mathematical and scientific principles. The project, which is being funded by an Eisenhower Grant, is a collaboration between UK and the Appalachian

Using Literature to Teach Math and Science



Rural Systemic Initiative. During the grant period, from January 2002 to June 2003, Moore and Bintz will work with approximately 75 teachers in grades four through eight from 35 counties in Eastern Kentucky.

“Many children don’t have a context for understanding science and math,” says Bintz, who came to UK from James Madison University in 1997 and who specializes in inquiry-based learning and teaching, reading across the curriculum, and curriculum development. “Good literature gives them that context and ‘eases’ them into the math and science. Children think in narrative terms, so we’re simply building on that strength.”

He reaches up to one of several long shelves of children’s books in his Dickey Hall office and pulls down *Sir Cumference & the First Round Table* by Cindy Neuschwander. Bintz explains that in this book Sir Cumference’s land is surrounded by a tribe called the Circumscribers. Sir Cumference is married to Lady Di of Ameter and they have a son named Radius. “This is clearly an engaging narrative that young children can tap into. They’re drawn into the story and along the way learn some basic mathematical principles,” Bintz says.

He recalls a very satisfying incident that followed from a classroom reading of this book when he was visiting an elementary school. “One boy came in the next morning and said, ‘Hey, Bill, guess what? I’m not a Radius!’ He explained that he had gone home and stood next to his mother. He wasn’t half her height yet, so he knew he wasn’t a radius. This was an immediate real-world application to what the boy had just learned.”

Another very useful book, Moore says, is *The Warlord’s Beads* by Virginia Walton Pilegard, which illustrates for young children a method of counting that’s ancient and time-tested: the use of an abacus.

“The main character is a boy whose father is the chief counter for the warlord. But people keep interrupting the father, which causes him to lose count,” Moore explains. “So the warlord starts thinking his bead-counter is shorting him, that’s he’s being cheated, and this clearly worries the boy.” But the father decides to put the beads on a stick, and this solution saves the day. The counting can now be referenced. “A child reading this will naturally identify with the boy in the story, so there’s a clear context for the importance of counting and a methodology.”

This book and previous work Moore has done in trying to help elementary-level teachers teach math led Moore and Bintz to develop a “hands-on” session for teachers in first and second grades. In explaining what this session involves, Bintz recounts a conversation he had with his daughter as they waited to board a plane.

“I was taking my daughter Madrean, age 14, with me to a professional conference, but she didn’t know what it was about. She asked, ‘Dad, what are you and Sara going to do there?’ ‘Well,’ I said, ‘we’re going to go to a conference for math teachers, and first we’re going to read this children’s book called *The Warlord’s Beads*. Then Sara and I are going to pass around a big box of Fruit Loops—all different colors—and different-colored pipe cleaners, and then we have this square card stock where we’ve taken out the center except for about a two-inch perimeter.’ ‘What are you doing all that for?’ she asked. ‘They’re going to make abacuses in this session, and then the teachers will go back home and help children learn mathematics.’”

“My daughter pan-faced me, looked me right in the eye, and, in a voice much louder than it needed to be, said, ‘And how old are you?’”

Moore admits that this conference session was good fun, which she says is exactly the point. “We’re using the baseline of play as a teaching tool, but for us this is serious play,” she says. By using a self-made abacus in the classroom, teachers can help kids learn about number sense and systems, place value, and re-grouping. “This is especially valuable for kids who are more visually oriented,” Moore adds.

And though play is an important ingredient in the mix of early childhood learning, Bintz and Moore are very serious about their methodology. What they would like to see, in fact, is nothing less than an entirely different approach to the teaching of math and science in the elementary-school classroom, one in which children’s literature would take precedence over traditional textbooks.

“If I were teaching math and science, I would still have a textbook in the class, but I’d use it merely as a reference tool—to look up facts or a summary of key words,” Moore says. “Ideally, the shelves of my classroom would look like this,” she says, gesturing to the hundreds of children’s books that line Bintz’s shelves in his UK office. “Here is a collection of wonderful, award-winning literature, many of these books fabulously illustrated as well. Why in the world *wouldn’t* I use them?”

Bintz admits that several teachers he’s spoken with have had misgivings about this approach. Some are worried that despite the interest that would be generated by using children’s literature, mandated standards might suffer. And some teachers are frankly uneasy about relegating the textbooks they’ve been using for so long to merely a supporting role.

“In thinking about our approach,” Moore explains, “we looked at national standards and Kentucky core content to make sure these goals would be met. We’re acknowledging these standards but saying, ‘Look how rich books like these can support the attainment of these standards.’ And ordered in a sequential way, these books can allow teachers to make some sophisticated decisions about when individual students are ready for different principles of math and science.”

Organizing dozens of books into such a sequence was a time-consuming but essential part of this project. Out of these efforts, several color-coded “text clusters” evolved, linking the stories to various scientific and mathematical concepts. One figure, for example, shows books that illustrate counting up,

counting down, the sum of a series of numbers, grouping, and skip-counting. Another figure lists literature related to shapes and measurement; and a third lists books that can lead students to an understanding of reasoning, topology, and dimensionality.

This approach may sound tantalizing for many elementary school teachers in Kentucky, but how many schools would be willing and able to buy—and continue to buy—these books?

“Schools can build libraries of these books; they just have to do it over time,” Bintz says. “The textbook allocation that comes from the state can be used for trade books like this. The stipulation is that the money has to be spent on instructional material, so buying these books would certainly be legitimate.”

“If I were a sixth-grade science teacher teaching 100 kids,” Moore says, “I could buy one set of 25 textbooks and instead of buying the other 75, I could spend that money on a collection of literature. The textbooks would still be there in the classroom, but I’d also have a collection of literature that I could continue to build. For instance, I would use *Mr. Archimedes Bath* by Pamela Allen to teach displacement, experimental design, and some history of science.”

In trying to garner support for this approach, Moore and Bintz initially modeled this method last January with a group of “teacher-partners,” classroom teachers in the 35-county area who have been temporarily released from their classroom duties. And this fall, Bintz and Moore plan to invite every school principal in the designated area to a meeting to discuss and model their approach. ■

