Using children’s literature to inspire K–8 preservice teachers’ future mathematics pedagogy

A growing body of research in the fields of mathematics education and literacy supports the inclusion of children’s literature into the teaching and learning of mathematics.

At 8:30 a.m. I entered my elementary mathematics methods classroom lugging what looked to be a very heavy suitcase with one-dollar bills bursting from the seams. I then announced to the 30 K–8 preservice teachers, who looked on rather curiously, that the suitcase contained a billion one-dollar bills. Greeted by jeers and laughter, I asked dramatically, between heavy gasps as I continued to roll the suitcase on its wheels around the room, “How long would it take to count the one billion dollars enclosed in this suitcase if I were to count a dollar a second?” Instantaneously one of the teacher candidates snapped, “A billion seconds!” Many of her classmates laughed at this simplistic, although accurate, response. However, I offered to the teacher candidates that, although “a billion seconds” does indeed answer the original question, it does not provide us with any true understanding or comprehension of the quantity, one billion.

After providing the teacher candidates with some think time to discuss and obtain a meaningful solution to the posed question, I recorded several of their estimates on the chalkboard. The class chuckled and gasped at the disparity between their recorded predictions which ranged from “a lot longer than this class,” to one week, to 10,000 years.

A choir of sighs and gasps sounded upon hearing that it would take almost 32 years (31.7 years to be more exact!) to count the suitcase of one billion one-dollar bills. Even more cries of astonishment filled the classroom when I placed the solution into a more meaningful context for them by asking the teacher candidates to reflect for a moment upon their age. Given that the majority of my students were approximately 21 years of age, I reminded them that, for every second, minute, hour, day, month, and year that they had lived on this earth, they would still have only counted approximately two thirds of the money! They were undeniably dumbfounded. By drawing the analogy between their age and the solution of ~32 years, these teacher candidates were able to grasp the enormity of one billion.

So how does an overstuffed suitcase and coming to grips with the magnitude of one billion relate to children’s literature? After revealing and discussing the solution to the “suitcase problem,” I reached toward my desk and read aloud the book, How Much Is a Million? (Schwartz, 1985) to my captive audience. Through the use of beautiful illustrations and clever analogous situations, to which young readers can readily identify, the author vividly depicts the concept of one million, one billion, and even one trillion, resulting in an increased understanding of the magnitude of these numbers.

To conclude this activity, I handed out several others of my favorite pieces of children’s literature that bring to life our place value system and the enormity of numbers (Demi, 1997; Nolan, 1995; Rosen, 1992; Schwartz, 1989, 2003; Wells, 1993, 2000). We then discussed as a group how they, as
future teachers, might effectively incorporate these books into the teaching of such mathematical topics as place value, number sense, exponential growth, ratio, and proportion. I was delighted when one of the teacher candidates interjected to share how a second-grade teacher whose class she was observing had just read the book *Big Numbers: And Pictures That Show How Big They Are!* (Packard, 2000) to his students as an introduction to our base 10 number system. She recounted how the teacher read the book animatedly to his class and how fascinated the children were, listening intently as the story unfolded, watching how the numbers grew larger and larger. This teacher candidate’s anecdotal testimony supported my closing comments in which I passionately described the rewards of incorporating children’s literature into the teaching of all content areas, in particular, mathematics, as a means to capture and engage more students’ attention and interest.

**Why mathematics?**

Previously described is just one of several literature-based activities in which I engage K–8 preservice teachers enrolled in a semester-long, field-based elementary mathematics methods course as a means to inspire them to integrate children’s literature into their future teaching—in particular, in the mathematics classroom. Perhaps the most vocal advocate for communication, both oral and written, in the Pre-K–12 mathematics classroom is the National Council of Teachers of Mathematics (NCTM). In its *Curriculum and Evaluation Standards for School Mathematics*, NCTM (1989) advocates the integration of children’s literature into the K–8 classroom because “Many children’s books present interesting problems and illustrate how other children solve them. Through these books students see mathematics in a different context while they use reading as a form of communication” (p. 28). Whitin and Whitin (1996) offered that literature can be used to engage students in meaningful conversations and investigations in mathematics, which serve as bridges for students to connect the abstract, symbolic language of mathematics to their own personal world. Furthermore, literature not only enables students to overcome the difficulty of communicating mathematically (Moyer, 2000), but literature also provides a means for mathematics and language skills to develop simultaneously as children learn to listen, read, write, and talk about mathematics (Hellwig, Monroe, & Jacobs, 2000).

According to Draper (2002), “Literacy and literacy instruction are necessary parts of mathematics instruction” (p. 523). While Siegel, Borasi, and Smith (1989) concluded that mathematics as a way of knowing and reading as a mode of learning are compatible in a mathematics classroom, Draper posited that “the two are not simply compatible, but inseparable in a constructivist mathematics classroom” (p. 524). Siegel et al. asserted that the mathematical achievement of children correlates highly with their ability to read mathematics and, similarly, Cocking and Mestre (1988) and MacGregor and Price (1999) posited that language proficiency and mathematics proficiency appear to be linked, such that lower language proficiency tends to translate into poorer mathematics performance. Beliveau (2001) advocated that teachers take a more active role in helping their students prepare to read, citing further that strong reading skills are essential in the area of problem solving (Tanner & Casados, 1998). Donahue (2003) also underscored the importance that all teachers, regardless of discipline, view reading as their responsibility.

Mathematics can be an intimidating language to learn, given that the user of this language needs to understand its symbols and their meaning and its obscure, abstract, and very formal terminology. According to Schell (1982), mathematics has some of the most difficult content area material to read as it presents more concepts per word, sentence, and paragraph than any other subject. In addition, “Many words have meanings in mathematics quite different from their meanings in everyday usage in conversation” (Reehm & Long, 1996, p. 36). Several other researchers (Adams, 2003; Berenson, 1997; MacGregor, 2002; Mather & Chiodo, 1994) also cited that students are challenged by mathematical terminology possessing alternative, everyday meanings. For example, Adams exemplified how mathematical terminology, such as *base, product, ruler,* and *fair,* also have alternative everyday meanings quite unlike their mathematical definitions. She also explained that another challenge of reading mathematics involved homophones—words with identical pronunciations—(e.g., *plane*...
versus plain, sum versus some, symbol versus cymbal), which also confound readers and learners.

Beliveau (2001) claimed that students’ mathematical literacy will increase if they practice writing about concepts and processes and cited Ediger (1996), who asserted that mathematics content is retained for a longer period of time if it is used in written work. Andrews (1997) also supported using writing to learn in all content areas, from math to science to social studies because it “provides a format for students to demonstrate their personal understanding of course content” (p. 142). In addition, Burns (1995) and Burns and Sibley (2001) advocated the regular use of math journals in K–12 classrooms as a means to focus students on examining their thoughts, thought processes, and perceptions while also providing the teacher with insights on students’ views and understandings of mathematics and their learning experiences.

Thus, given that many mathematical ideas and concepts are abstract or symbolic, children’s literature has a unique advantage in the mathematics classroom because these ideas and concepts can be presented within the context of a story, using pictures and more informal, familiar language. Braddon, Hall, and Taylor (1993) posited that “Elementary students who love good literature are often the same children who dislike completing worksheets filled with math problems or who struggle with those troublesome word problems” (p. xiii). By integrating mathematics and literature, students gain experience with solving word problems couched in familiar stories and thus avoid struggling with unfamiliar vocabulary. Furthermore, mathematical activities stimulated by children’s literature can inspire students to more actively explore and investigate mathematical concepts while fostering the realization that mathematics is everywhere in the world around them (Braddon et al.). Moreover, picture books used in the mathematics and science curricula that relate content to the real world are beneficial for students’ understanding of specific concepts and may encourage them to seek a career in the sciences (Carr, Buchanan, Wentz, Weiss, & Brant, 2001).

Supported by the growing body of research on literacy in the mathematics classroom (Adams, 2003; Andrews, 1997; Beliveau, 2001; Berenson, 1997; Carr et al., 2001; Cocking & Mestre, 1988; Donahue, 2003; Draper, 2002; Fuentes, 1998; Geskus, Borden, & Burnett, 1999; MacGregor, 2002; MacGregor & Price, 1999; Mather & Chiodo, 1994; Reehm & Long, 1996; Schell, 1982; Siegel et al., 1989; Tanner & Casados, 1998) and inspired by the research and anecdotal evidence documenting the benefits of integrating children’s literature with the teaching and learning of mathematics (Braddon et al. 1993; Bresser, 1995; Burns, 1992, 1995; Burns & Sibley, 2001; Carr et al., 2001; Griffiths & Clyne, 1991; Hunsader, 2004; Kolakowski, 1992; NCTM, 1989; Richardoson & Gross, 1997; Roberts, 1990; Schiro, 1997; Thiessen, 2004; Thiessen, Matthias, & Smith, 1998; Welchman-Tischler, 1992; Whitin & Whitin, 1996, 2001, 2004; Whitin & Wilde, 1992, 1995), I passionately and regularly engage the pre-service teachers enrolled in my elementary mathematics methods course in activities that showcase children’s literature. My primary goal is to allow the teacher candidates to experience firsthand how literature can make the learning of mathematics more engaging and less intimidating. By demonstrating how children’s literature connects mathematics to other content areas, I hope to contribute to the pre-service teachers’ developing pedagogical knowledge by providing them with authentic mathematical investigations that they might implement with future K–8 students. Articulated in this article are some of the activities with which I have met great success.

Connecting mathematics, social studies, and science

Hellwig et al. (2000) and Leitze (1997) asserted that integrating literature into the mathematics curriculum provides a natural setting for observing mathematics in the real world, making it come alive and thus conveying real meaning to students. In a similar manner, Richardson (2000) believed that books chosen to read aloud to older students should contain provocative issues and moral dilemmas to stimulate critical thinking and discussion and promote collaborative construction of meaning. A piece of children’s literature that captures this sentiment, one that I integrate with my elementary mathematics methods course, is If the World Were a Village (Smith, 2002), which powerfully delivers the message that mathematics is everywhere around us in startling ways. In the book’s opening passage, Smith cleverly places into
a more numerically comprehensible perspective for the reader our world’s population of 6.2 billion using the lens of a “global village”—a village comprising 100 people where each villager represents 62 million people. He then invites his reader on a mathematical and culturally eye-opening journey into the village to greet and learn about its people in terms of such demographics as population and age distributions; languages spoken; religions; and access to clean water, electricity, food, schooling, and possessions. Smith’s book not only provides readers with a fascinating and vividly colorful exploration of real-world data, but it also instills in readers his philosophy of “world mindedness,” where we know our neighbors, where they live, and how they live.

During a recent three-hour classroom activity, a cohort of teacher candidates embarked on a journey into Smith’s (2002) global village, guided by myself and their social studies methods instructor, working jointly in a team-teaching scenario. They collaborated in groups of four and were challenged to predict, discuss, and then paint the “landscape” of the global village, a microcosm of the entire world, in an attempt to match the statistical data detailed in Smith’s book. The teacher candidates were given a bag of 100 beans, representing the 100 people residing in the global village, and they used maps to predict population and demographic distributions. Following this, they collaborated in pairs to collect their own data depicting a yet unexplored facet of the global village, using world almanacs, the Internet, and other resources. A week later, the teacher candidates returned to class and each pair presented their data, which was in the form of a colorful pie chart, developed using spreadsheet software. At the end of the presentations, the teacher candidates wrote about how powerful the activity was, noting their increased sense of world mindedness. As one teacher candidate noted, “In this day and age you would think everyone would have access to electricity. I never realized how lucky we really are.”

During class, as these K–8 preservice teachers navigated through Smith’s (2002) global village while the story was told, they not only engaged in data collection and graphical representation and analysis, but they also explored other interconnections of mathematics, including number sense, estimation, reasoning, and communication. In addition, cross-curricular connections to science and social studies permeated the activity, as the teacher candidates became more knowledgeable of the world’s environmental and ecological issues, cultural differences and inequities, geography, population distributions, and demographics. The teacher candidates also used spreadsheet software and the Internet in an appropriate fashion, which modeled for them how to effectively integrate technology into a classroom activity. Thus, their trek into Smith’s global village not only served as an exemplar of what the NCTM (2000) termed a “worthwhile task” (pp. 18–19), but it also served as a model for these future teachers of how to effectively integrate real-world data exploration and analysis and children’s literature into the K–8 mathematics classroom while experiencing the cultural diversity and inequities present in their world.

I believe that teachers of grades 5–12 could most certainly implement this activity with their students as described, in particular, the initial portion of the activity where beans are used to predict world populations and other demographics detailed in Smith’s (2002) book. If students do not have access to spreadsheet software, they could certainly create pie charts manually. Furthermore, if Internet access is unavailable, students could refer to almanacs and other hard-copy materials for world data. Even simply sharing one demographic statistic a day from Smith’s book would promote world-mindedness among tomorrow’s adults.

Colorfully connecting mathematics, geography, and mapmaking

Until recently, placing children’s literature and the Internet together in the same sentence was not considered appropriate; however, a growing number of educators are discovering exciting ways for students to interact with literature on the Internet (Leu, Castek, Henry, Coiro, & McMullan, 2004). When thoughtfully integrated, the Internet can provide young students with opportunities to travel to new places and experience more powerful and richer responses to children’s literature (Leu et al.). I recently integrated an Internet-based book with my elementary mathematics methods course; namely, The Story of the Young Map Colorer (www.c3.lanl.gov/mega-math/workbk/map/mpprstory.html). The
primary goal of this activity was to introduce teacher candidates to the existence and accessibility of what I call *techbooks*; that is, those books housed on the Internet or in electronic form, created using presentational software such as PowerPoint or Hyperstudio. My secondary goal was to showcase and explore another piece of children’s literature focusing on mathematics with cross-curricular connections (namely social studies) and couched within an authentic investigation of mapmaking.

During class, when I first linked to the story, many of the teacher candidates were surprised to learn that you could access an entire storybook on the Internet. This discovery sparked an unplanned discussion of how the Internet has opened up many avenues to educators, allowing them to obtain affordable and, most times, free learning resources and materials. The teacher candidates then watched and listened as the story, narrated by me, unfolded on the screen in the front of the classroom. In order to fully experience the motivating influence of literature, I encouraged the teacher candidates to focus initially on the enjoyment of the story as opposed to the mathematics, as suggested by Narode (1996).

Once upon a time there lived a young map colorer. It was her job to color all the maps of the neighborhoods and regions of the kingdom.... In those long ago days, crayons were rare and very expensive. So the young map colorer tried to use as FEW crayons as possible when she colored her maps. (*The Story of the Young Map Colorer*, n.d.; used by permission of the University of California, operator of the Los Alamos National Laboratory under Contract No. W-7405-ENG-36 with the U.S. Department of Energy)

As the short story continues, the young map colorer is greeted by a representative from several villages in need of her map-coloring skills. The story ends with a problem for her and the reader to solve: What is the fewest number of crayons the young map colorer can use so that no two neighborhoods or regions that share a boundary on the map are the same color? This problem may not resonate with nonmathematicians; however, those of us who have studied topology may be reminded of the Four-Color Theorem, which, although never proven, asserts that no more than four colors are needed to color any map, no matter how complex and intricate, such that regions sharing the same boundary are different colors.

After reading the story, I provided each of the teacher candidates with a blank map of the United States and a package of crayons. I asked my student map colorers to view the map and to first predict the least number of colors needed to color the map as previously described. After several of the class’ predictions were recorded on the chalkboard, the teacher candidates sought a solution by actually coloring their map. As the teacher candidates colored, not only did they engage in the mathematics of the activity, modifying their original predictions and sharing their coloring strategies, but they also honed their geography skills as some of them challenged their neighboring classmates to identify names of states and state capitals. After their maps were colored, we compared their original predictions to their empirical results and then discussed whether their results were generalizable to all maps. I then provided my map colorers with the mathematics behind the famed Four-Color Theorem and its real-life applications to mapmaking.

Upon reflection, what made this activity come to life for the teacher candidates was the reading of *The Story of the Young Map Colorer*. Had I explored the famed Four-Color Theorem solely as a problem-solving exercise, I do not believe it would have been greeted with as much interest on behalf of the teacher candidates had the story not been read first. The story placed mathematics into a real-life, plausible context. As was the case with the books *If the World Were a Village* (Smith, 2002) and *How Much Is a Million?* (Schwartz, 1985), the use of this piece of children’s literature engaged the learners in meaningful conversations and authentic investigations in mathematics and, in this example, geography. Furthermore, as noted by Whitin and Whitin (1996), the literature provided a forum for the teacher candidates to connect the abstract language of mathematics to their personal world. Thus, not only did the preservice teachers engage in mathematical problem solving, but they also discovered the existence of *techbooks*, which are as powerful as any paperback book and can be easily adapted into a classroom activity.

Teachers of grades 3–8 can implement this mapmaking activity as a means to explore the various strategies students employ when problem solving and to allow students to communicate their
strategies. In the case of these preservice teachers, some colored from west to east, some from east to west, while others started in the middle of the United States and colored in an outward fashion. Also, some students employed The Greedy Algorithm and placed a number on adjacent states, noting each time they would have to make a change of color. Regardless of the strategy employed, the majority of the teacher candidates obtained the correct solution. What is most important in this activity is the final sharing of the students’ thought processes and strategies as they tackled the problem, reminding their classmates of the variety of ways that exist to problem solve. To create the math–literacy link, the teacher should ask students to record their strategies in their journal or verbally share them.

In addition, this activity may serve as a springboard for reading to students other pieces of children’s literature dealing with maps. For example, *Maps and Globes* (Knowlton, 1985) provides readers ages 9–12 with a history of mapmaking, an introduction to the different kinds of maps, and explanations of how to read maps and globes. Also, *Small Worlds: Maps and Mapmaking* (Romano-Young, 2002) provides young readers with a history of mapmaking and illustrates all of the difficulties that early geographers encountered when attempting to create a graphic representation of the world.

### Connecting mathematics and poetry

Perplexed, panicked faces greeted me when I finished writing the following mathematical expression on the chalkboard:

\[
( (12 + 144 + 20 + 3 \sqrt{4}) / 7 ) + 5 \times 11 = 9^2 + 0
\]

I heard one preservice teacher whisper to a classmate, “Are we having a test today? She never gives pop quizzes!” I paused then for a few dramatic moments, fascinated by the puzzled, anxious looks on my students’ faces. Their fears subsided when I announced, “Does this look like a limerick to you?” A resounding “No!” echoed in the classroom, but the students’ puzzled stares remained. I then recited the following poem:

A dozen, a gross, and a score,
plus three times the square root of four,
divided by seven,
plus five times eleven,
is nine squared and not a bit more.

(www.math.hmc.edu/funfacts/ffiles/100018.shtml)

Laughter abounded and a sigh of relief was audible upon discovering that this was not a pop math quiz! I then informed my K–8 preservice teachers that we were going to explore mathematics through the use of poetry.

Schiro (1997) contended that one of the keys to a student’s success in mathematics is possessing the ability to communicate mathematically. Mathematics educators advocate the frequent use of writing as a communication tool because it not only provides opportunities for young learners who are uncomfortable in oral situations to express understanding in a less public forum, but it also allows students to clarify their thinking and to learn from one another. In the *Principles and Standards for School Mathematics*, NCTM (2000) argued that writing in mathematics can help students consolidate their thinking because it requires them to reflect on their work and clarify their thoughts about ideas. NCTM also asserted that communication is an essential part of mathematics and mathematics education and that students need to develop a language for expressing mathematical ideas and an appreciation for the precision in that language. Several other researchers (Andrews, 1997; Beliveau, 2001; Burns 1995; Burns & Sibley, 2001; Ediger, 1996) also noted the importance and benefits of engaging students in writing activities in the mathematics classroom. Thus, teachers should provide students with opportunities, encouragement, and support for speaking, writing, reading, and listening in mathematics classes.

In order to advocate mathematical writing, perhaps of a slightly different kind, in my elementary mathematics methods course, I recently implemented an activity where the preservice teachers were required to author a children’s book of mathematical poetry. The teacher candidates were instructed to pick any K–8 mathematical topic and poetically describe their topic by creating their own original haiku, limerick, cinquain, and diamante. These four types of poetry were specifically chosen because their creation requires one to follow a
specific mathematical formula based on word count, number of syllables, or a uniquely rhythmic pattern. They were encouraged to colorfully and creatively illustrate their book using PowerPoint; image manipulation software (e.g., Clarisworks or Adobe PhotoShop); or magic markers, crayons, felt, stickers, and the like in hopes that they would share their book of poetry with a future group of K–8 students. This activity modeled for the pre-service teachers how to connect mathematics with language arts while encouraging creative writing skills. Shown in Figures 1 and 2 are samples of two teacher candidates’ poetry.

I was very impressed with the literary ingenuity demonstrated in the teacher candidates’ work, as were they, especially after several of the preservice teachers verbally doubted and discounted their poetic abilities. After sharing their favorite entry in their mathematical poetry book with the class, the teacher candidates agreed that this writing activity would be one that they could confidently implement in their future classrooms. In fact, one year later, I received an e-mail from a former student who implemented a modified version of this poetry book authoring activity with her fourth graders. After covering a unit on quadrilaterals, the students selected one poetic verse of their choice and then authored a poem about a particular quadrilateral (i.e., square, rectangle, parallelogram, trapezoid, or rhombus) using construction paper, magic markers, and crayons. The teacher then not only decorated a corner of her classroom with their poetic work, but she also scanned in some of their work and created a PowerPoint presentation to showcase on parents’ night (Figure 3). She closed her e-mail touting how much praise she received from her principal, parents, and other teachers who visited her classroom, admiring not only the students’ artwork and creative writing skills but also her ability to connect mathematics with language arts and technology. In addition, she expressed that her students were more willing to learn the definitions and that they seemed to recall the definitions better because of the rhymes. She also added that this writing activity was far more creative than just copying terms off of a chalkboard. She wrote, “It was really a hands-on activity in a sense. The kids loved making up the rhymes.”

**FIGURE 1**
A teacher candidate’s mathematics haiku

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Average
Mean, median, mode.
I am stuck in the middle.
I am typical.
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**FIGURE 2**
A teacher candidate’s mathematics limerick

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Symmetry

When something is symmetric, both sides look the same.
The right looks like the left; its all just a game.
There’s symmetry in shapes,
And even in our game!
Mom, Dad, Wow! There’s symmetry in a name!
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**FIGURE 3**
A fourth grader’s haiku about a square

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SQUARE
I have four sides too.

CONGRUENT ANGLES AND SIDES
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MOM, DAD

I have four corners.
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Authoring a piece of children's literature

Another writing opportunity that I recently provided to K–8 preservice teachers enrolled in an elementary mathematics methods course was to author a piece of children’s literature whose focus was any K–8 mathematics topic. To promote the teacher candidates’ success and to spark their creativity in completing this project, I encouraged them to reflect on the variety of pieces of children’s literature that I had integrated and which they had explored as part of the course (e.g., pop-up books, texture books, wordless books, rhyming books, fairy tales, riddle books, allegories, biographies). I also suggested that they reflect on writing styles (e.g., alliteration, rhyme, hyperbole, poetic verse, pun) they had explored concurrently in their language arts methods class. Furthermore, the preservice teachers were also encouraged to develop a techbook using presentational software such as PowerPoint or Hyperstudio.

The teacher candidates had the entire semester to work on their piece of children’s literature. On the final day of class, the teacher candidates read their books to their classmates and briefly discussed why they had chosen the specific mathematical topic of their book. Their book topics included counting, money, telling time, fractions, integers, probability, polygons, measurement, and real-world math.

Prior to reading her semiautobiographical book, one preservice teacher recalled the difficulty she encountered in grade school when working with negative numbers, claiming, “In real life, most times negative numbers are bad, like in a checkbook.” Thus, her book tells the tale of a young girl desperately seeking “positive” examples of negative numbers. Another teacher candidate authored a semiautobiographical sketch of a young girl who learns about using nonstandard units of measurement by trying on her father’s shoes and comparing his shoes’ length to familiar objects.

Another class favorite was a techbook designed using PowerPoint and narrated by Mr. Chip, a chocolate-chip cookie, illustrating nonthreatening ways to think of fractions conceptually using real-life situations. The teacher candidate explained, “I noticed many of the second graders in my field-based classroom struggling with fractions, so I wrote this book in hopes that I might alleviate their fears about fractions and make learning about them fun.” Another techbook created using PowerPoint was an allegorical tale about a denominator who took umbrage at being made “common.” The author of this techbook explained, “I wanted to write a book with a message for my future students, and I thought that too often we are pressured to conform. So the concept of common denominator just popped into my head.”

Other unique pieces of children literature developed by the preservice teachers included a book in which the reader manipulates pieces backed with hook-and-loop fasteners to continue the pattern printed on each page; a collection of rhyming poems about time, money, angles, and numbers; an interactive techbook with sound and animation that invites the reader to explore and discriminate between and among the family of triangles; and a storybook beautifully illustrated in watercolors detailing how math is everywhere in our world (Figure 4). Several other book titles, cover pages, and story pages made by preservice teachers can be viewed by selecting the link “Book Authoring Activity” located at www.ed.arizona.edu/ward/TTE%20326-Spr04/welcome.htm.

The round of applause that echoed after each preservice teacher shared his or her book served as a clear indicator of the success of this book authoring activity. The class unanimously agreed that engaging their future K–8 students in a similarly designed book authoring activity would be a rich experience for their students and for themselves. The teacher candidates offered that young students would benefit from the opportunity to express their thoughts, fears, ideas, and notions about mathematics (and other content areas as well) through a creative, nonthreatening activity, while they as future teachers would gain insight on their students’ mathematical thinking, attitudes, and experiences, not to mention their students’ verbal and artistic abilities. In addition, many of the teacher candidates commented in their journals about how much they look forward to sharing their mathematical masterpieces with their students during their upcoming student teaching experience the following semester.

In fact, one teacher candidate recently shared how she used her book with second graders during her student teaching. She had designed several...
math centers whereby students working in groups of four would visit each center and then work collaboratively to complete the preplanned activity at each center. At one of them, the students explored the student teacher’s book and then collaboratively worked to finish the patterns on each page. The teacher candidate ecstatically recounted how her students were amazed with the fact that she had authored her own book commenting, “You must be really smart!” She further added that using her book in a small-group setting was just as effective as doing a whole-class patterning activity using concrete manipulatives, such as unifix cubes or pattern blocks. Another teacher candidate, who was now a first-grade teacher, engaged a class of 28 bilingual first graders in a whole-class read-aloud who, days earlier, were working with number lines. She used her book as a springboard to introduce the idea of negative numbers while showing their location on the number line. In describing the activity to me, she chuckled, “Although my students seemed to enjoy my book, they seemed more interested in the snow that appeared in the book as opposed to the negative numbers! In Tucson, you don’t see much snow!”

During the last week of her student teaching, one preservice teacher observed two fourth graders reading her book, and they allowed her to pose...
questions as they read. Prior to their reading of her book, as a means to get them focused on the concept of measurement, she asked “Have you ever tried on your mom’s or dad’s shoes to see how big their feet are compared to yours?” She then engaged the students in a brief discussion detailing how you can measure objects in real-life with instruments other than rulers and tape measures. At the end of the story, one of the students said that it was “a cool idea to measure things without a ruler,” something he admitted he would have never considered doing. The student teacher also commented that using her book in this small-group setting allowed her to ask more pointed math questions to get them to think about measurement in different ways. She felt she would not have been able to do as well had she not used her book or if the entire class was engaged in a read-aloud. She also added that the colorful pages and the fact that the book was in the shape of a foot captured the students’ attention and, consequently, kept them more engaged in wanting to talk about the mathematics of measurement.

Finally, the teacher candidate who authored a mathematical poetry book recounted how she, during her student teaching, engaged her second graders in a read-aloud of it:

My students were having problems with odds and evens, so I shared that poem with the whole class. I also shared the one concerning money. They really had a tough time remembering which coin stood for what, so that was very helpful. I started my money lesson with the poem after seeing how much it helped with odds and evens.

The teacher candidate further noted that she planned on reading this book with her future classes of students because they “got a kick out of the rhymes” and that “Having a tune that rhymed really seemed to help the kids. Plus it was easier to remember.”

Final thoughts

A current preservice teacher recently shared with me that, after reading a piece she authored to her fifth graders, one student added, “Some people like math but don’t like reading. And some people like reading but don’t like math. If you mix them, you can make more people interested.” Reflecting on this “extremely good point,” she stated, “I never thought about that before. I only saw my book as a math learning tool and not so much as a way to bring students into reading.” Clearly, the power of using children’s literature in a mathematics classroom was now self-evident to this teacher candidate. I felt incredibly rewarded!

In closing, the mathematics–literature connection holds much promise for enriching the teaching and learning of mathematics. According to Hoewisch (2000), “The value of children’s literature to children’s literacy development cannot be contested.... Preservice teachers cannot be expected to know how to use children’s literature as a purposeful and meaningful educational tool unless we teach them well.” Thus, teacher educators need to equip K–8 preservice teachers with the tools and knowledge of pedagogically sound strategy for effectively integrating literature with their future classrooms. By providing my K–8 teacher candidates with such tools, resources, and strategies and, most important, by allowing them to explore and experience children’s literature in authentic classroom investigations, I hope to create a microcosm of teacher candidates who are literature savvy and prepared and motivated to teach elementary mathematics in an engaging fashion with a focus on reading, writing, and communicating mathematically.

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