Reading Horizons: A Journal of Literacy and Language Arts

Volume 45
Issue 1 *September/October 2004*

Article 3

10-1-2004

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Though poetry and math may seem to be unrelated, there are parallels such as rhythmic language and language skills. Reading and writing poetry about math involves students with listening, speaking, reading, and writing in order to develop and demonstrate an understanding of mathematical concepts and relationships. This article features an annotated list of mathematical poetry books and a variety of writing ideas for math poetry. Encouraging students to read and write poetry about math will encourage them to find a deeper meaning of math concepts as they develop their poetic voices.

AT FIRST GLANCE, it would appear that poetry and math are at the opposite ends of the elementary curriculum. Poetry relies on the nuance of metaphor, the crispness of diction, a dance of symbolism, emotion, and action. On the other hand, math is governed by rules and a demand for estimates and right answers; it presents students with rows and columns of numbers and requests a solution. Upon closer examination it is obvious that both poetry and math rely on patterns and are dependent on students' skill with language, whether it is the language of verse and rhythm or the language of symbols and signs. The research on the relationship between rhythm and math, the importance of language skills to math, and the benefits of writing poetry are relevant when proposing that reading and writing poetry in math classes will be valuable for students.

Review of related literature

The relationship between rhythmic language and math

When defining poetry, people usually include phrases such as: "an important characteristic of poetry for children is the musical quality of the work" (Danielson & LaBonty, 1994, p. 144) or "a poem has a music of its own" (Huck, Hepler, Hickman, Kiefer, 2001, p. 352) or "poetry is the rhythm of our living" (Luce-Kapler, 1999, p. 298). It does not seem possible for us to talk about what poetry is or is not or how to create it without referring in some way to rhythm or music, and it is the musical nature of poetry that connects it to math. The claim that rhythm and math are connected is supported by the research regarding the language preferences of infants and children and studies that link exposure to music to skill with math.

A preference for rhyme and rhythm is contained in the linguistic make-up of all humans; rhyme is easier to recall than prose; rhythm helps carry the predictability of language. There is pattern and measure in every language and in the way we structure our lives (LaBonty, 1997a). We know that infants are born with a preference for hearing the musical type of language that parents supply almost automatically when they talk to a baby. This soft, lilting language, often called 'baby talk' or 'parentese', includes changes in stress, pause, and juncture, and the

repetition and rhyme that are the exact elements of poetry (Reich, 1986). Once they learn to talk, children still cling to a love of musical language; as young as three they invent their own rhymes and poetic, sing-song speech (Danielson & LaBonty, 1994).

With studies that further connect rhythm to math, researchers have reported that exposure to music rewires the neural circuits in the brain, enlarging its somatosensory cortex of the brain (Begley, 1996). Applying this complex information to practice, Shaw and Rauscher (as cited in Begley, 1996) found that children who took music lessons improved significantly in their ability to solve mazes, draw geometric figures, and copy patterns. The results of their study led them to conclude that music strengthens the circuits in the brain that will later be used for math. The attention to, and expectation of, a pattern that is developed when listening to music is also reinforced in poetry.

The importance of language skills to math

Poetry is an ideal vehicle for fine tuning language skills (Hadaway, Vardell, & Young, 2001), and skill with mathematics is dependent in part on students' facility with math as a language and their comprehension of the language of math (Miller, 1993). The National Council of Teachers of Mathematics has included the importance of the "language of math" for students in all grades (*Principles and Standards for School Mathematics*, 2000, p. 60). Monroe and Livingston (2002) emphasize the important role that language plays in understanding math. They suggest that children's trade books (picture books) can provide an ideal vehicle for learning this unique lexicon. Concepts of numeracy; relationships such as first, same, different; geometric labels, and information about time, money, and measurement are appealingly presented in picture books for children. Illustrations are designed to entice and enhance the text and in doing so they encourage prediction on the part of the reader, a skill essential in math (Monroe & Livingston, 2002).

The facets that make picture books conducive to learning the language of math are evident even more powerfully in poetry, in part due to its brevity, rhyme, and repetition (Christison & Bassano, as cited in Reid, 1995). Poetry contains the same elements of story grammar that

makes trade books written for children so appealing (Cullinan, Scala, & Schroder, 1995). Oral reading activities that center on poetry enhance fluency, a component of mastering any language (Gasparro & Falleta, 1994). The brevity, the strong aural quality, and the clear focus of poetry make it ideal for language development. Many of the benefits of sharing poetry with children also support the skills that are needed for success with math: poetry enhances oral reading skill and improves the ability to listen and it exposes children to rich vocabulary words (LaBonty, 1997a). Reading and listening to poetry about math allows children to use language to learn about math while satisfying their need for beauty in words.

The benefits of writing poetry

The values of having children write poetry are also well-documented. Steinberg (1999) asserts that writing poetry develops children's facility with metaphorical language, a precursor to abstract thinking. Huck et al. (2001) discuss the value of having children write poetry as a means to excite them about reading it. The language play that is integral to poetry helps children expand their understanding of the world and how it functions (Grainger, 1999). Luce-Kapler (1999) states that "the writing or reading of a poem is a way of coming to know in a different language" (p. 299).

Kuhlman and Bradley (1999) recommend poetry writing as a means of helping children develop voice in their written work. The collaborative work that can be involved in writing poetry helps children function as "problem solvers rather than information receivers" (Hadaway et al., 2001, p.798). Creating poetry that explores and demonstrates mathematical concepts accomplishes many goals. It involves students with listening, speaking, reading, and writing in order to develop and demonstrate an understanding of mathematical concepts and relationships.

Reading poetry about math

Poetry evokes emotions and gives clarity and fresh originality to the abstract and challenging facets of math. It is simultaneously reductive and expansive and by using all the features of language, poets can stretch

our understanding of difficult concepts while they surprise and intrigue us. There are several collections of poetry and individual poems about math that will appeal to teachers and students. Whether a poem is used to introduce or conclude math class it will catch the attention of the class and give a unique perspective and an invigorating outlook on the topic at hand.

Mathematical poetry books

Atherlay, S. (1995). *Math in the bath (and other fun places, too!).* Ill. by M. Halsey. New York: Simon and Schuster.

Math is everywhere, if we only pay attention! These poems feature math throughout the school day (in music, art, social studies, recess) and math at home as well (dividing a pizza, bubbles in the bath). The book ends with a list of mathematical concepts found each day, a perfect invitation for further writing about math.

Barrett, J. (2002). *I knew two who said moo.* Ill. by D. Moreton. New York: Scholastic.

This counting book focuses on the rhyme of each of the numerals, 1 through 10. Students might try to write their own rhymes for other numerals (11 through 20) for a class book or act out the story in Reader's Theatre format with illustrated posters or pictures.

Franco, B. (1999). *Counting caterpillars and other math problems.* New York: Scholastic.

Poems and companion activities are included in this lively collection of verse about counting, addition, subtraction, shapes, patterns, measurement, time, and money.

Heide, F. P., Gilliland, J. H., & Pierce, R. H. (1999). *It's about time.* Ill. by C. Flalwell. New York: Hyperion.

Illustrated with the charming actions of a blue-haired child, this book contains poems about the minutiae of telling time and the grander concepts of past and present.

Hopkins, L. B. (1997). Marvelous *math: A book of poems.* New York: Simon & Schuster.

This collection of 16 math poems presents a variety of math concepts in verse form. From time to measurement and even the occasional outrage of math (Sammy has a long division poem stuck in his brain), this medley of math poems celebrates the subject matter.

Lewis, J. P. (2002). *Arithme-tickle: An even number of odd riddle-rhymes.* Ill. by rank Remkiewicz. San Diego: Harcourt Brace.

This is a collection of rhyming word problems that encourages readers to apply their mathematical problem solving skills. Answers are found upside down at the bottom of each page.

Pappas, T. (1991). *Math talk: Mathematical ideas in poems for two voices.* New York: Wide World Publication.

Pappas' book features poems about a variety of mathematical concepts such as googols, radicals, and triangles in side-by-side verse that is meant to be read by two voices. The format serves as an ideal vehicle for having students use the poet's pattern to write their own math concept poem (See examples further on).

Shields, C. D., & Meisel, P. (1995). *Lunch money and other poems about school.* Ill. by P. Meisel. New York: Trumpet.

Shields and Meisel have written poems that address schools issues familiar to every child: finding lunch money, learning how to add, writing the dreaded book report, and watching the clock for recess time.

Tang, G. (2001). *The grapes of math.* Ill. by H. Briggs. New York: Scholastic.

This rhyming book of verse offers various addition problems that advise the reader to group the objects on the page to add. The back of the book offers strategies (such as grouping by ten) to make adding large numbers easier. Students could use these poems as a springboard for their on math strategy poems.

Tang, G. (2002). *Math for all seasons.* Ill. by H. Briggs. New York: Scholastic.

Another rhyming book of verse gives children story problems to solve. The back of the book again offers strategies for answering each one. In the preface of the book, Tang suggests that this book might "make a smoother transition from counting to arithmetic by introducing intuitive ways to group and add numbers" (Tang, 2002, unpaged).

Ziefert, H. (1999). *Mother Goose math.* New York: Puffin.

Mother Goose is used to highlight the numbers. From "1, 2, Buckle My Shoe," to "Sing a Song of Sixpence," math and Mother Goose join together for a trip down memory lane.

Poems about math

Numerous poetry anthologies contain individual poems related to math that can be shared with students.

Ciardi, J. (1985). *Doodle Soup.* Ill. by M. Nacht. Boston: Houghton Mifflin.

"There's nothing to it" p. 12
"How much is a gross?" p. 28

Dakos, K. (1990). *If you're not here, please raise your hand.* Ill. by G. B. Karas. New York: Simon and Schuster.

"Math is brewing and I'm in trouble" p. 4
"They don't do math in Texas" p. 17

Korman, G., & Korman, B. (1992). *The D-poems of Jeremy Bloom.* New York: Scholastic.

"How to wake a guy for school" p. 81
"I pulled an A" p. 88.

Merriam, E. (1989). *Chortles.* Ill. by S. Hamanaka. New York: Morrow.

"Gazinta" p. 9
"A number of words" p. 16

Prelutsky, J. (1983). *The Random House book of poetry for children.* Ill. by A. Lobel. New York: Random House.

"Homework" p. 141 (Russell Hoban)
"Homework" p. 141 (Jane Yolen)
"Smart" p. 157 (Shel Silverstein)
"Arithmetic" p. 218 (Carl Sandburg)

Prelutsky, J. (1984). *The new kid on the block.* Ill. by J. Stevenson. New York: Greenwillow.

"Nine mice" p. 9
"A Microscopic topic" p. 100
"Forty performing bananas" p. 147

O'Connell George, K. (2002). *Swimming upstream: Middle School poems.* Ill. by D. Tilley. New York: Clarion.

"Math" p. 26
"Is it Monday again?" p. 38

Silverstein, S. (1981). *A light in the attic.* New York: Harper and Row. (unpaged)

"How many, How much?"
"Homework machine"
"Eight balloons"
"Shapes"

Silverstein, S. (1996). *Falling up.* New York: Harper Collins. (unpaged)

"The monkey"
"Allison Beals and her 25 eels"

"When I was your age"

Writing poems about math

Once children have been exposed to the variety of poetry about math they will be ready to try their hands at writing math poems. Poetry is briefer than prose and writing it makes less demand on time during the day; its brevity is appealing to novice writers. The process lends itself to partner work, cooperative writing, and solitary writing, giving the teacher flexibility in grouping for poetry-writing activities during math class. When we remove the expectation of rhyme, poetry writing takes on new possibilities of quality writing since skillfully-written children's poems often depend on syllable count, on a specific number of words, or on certain parts of speech for rhythm and structure (LaBonty, 1997b; Luce-Kapler, 1999).

The quality of the finished products can be enhanced with specific teaching strategies. If children brainstorm before they begin their poems it will help them choose words carefully. Developing semantic maps will encourage young poets to organize their thoughts. Once the teacher has introduced the rhythmic elements or pattern of a certain poem, one or two examples can be developed as a class.

I used to be . . but now poems

Students can use the following pattern to describe mathematical terms:

I used to be _____
But now I'm _____

The following example was written by fifth graders:

I used to be a 10, but now I am 100 (because I was squared)
I used to be a 9, but now I am a 3 (because I was square rooted)
I used to be a 15, but now I am a 3x5 (because I was factored)
I used to be a 3/3, but now I am a 1 (because I was divided)

Alphabet pyramids

These are cumulative poems that contain specific parts of speech that begin with the same letters.

Line 1: the letter
Line 2: a noun
Line 3: add an adjective
Line 4: add a verb
Line 5: add an adverb

The following example was written by middle school students:

R
Remainder
Reluctant remainder
Reluctant remainder remembers
Reluctant remainder remembers recess

Terquain

A terquain is a descriptive, three line poem.

Line 1: one word, the subject
Line 2: one or two words about the subject
Line 3: one word, a feeling about the subject

This is a terquain from a second grader:

Circle
Big ball
Round

Cinquain

A cinquain is a five line descriptive poem that contains about 22 syllables.

Linel: the subject
Line 2: four syllables describing the subject
Line 3: six syllables showing action
Line 4: eight syllables expressing a feeling or observation about the subject
Line 5: two syllables renaming the subject

Sixth graders wrote this cinquain about base numbers:

Base 2
Two numerals
Only two numerals
Representing all the numbers
Zero, One

Diamante

A diamante is a seven line poem that compares opposites using specific parts of speech. The diamond shape of the finished product gives this poem its names and it is ideal for helping students compare and contrast mathematical concepts.

Line 1: noun for the subject
Line 2: two adjectives describing the subject
Line 3: three participles
Line 4: four nouns, two about the subject, two about its antonym
Line 5: three participles describing the antonym
Line 6: two adjectives
Line 7: the antonym

The following examples are from middle school students studying geometry:

Square
Flat, same
Drawing, measuring, rotating
90 degree angle, lines / brick, eraser
blocking, building, erasing

three-dimensional, hard
Cube

Base
Parallel, flat
Measuring, counting, seeing
Floor, ceiling / walls, sides
Classifying, building, dividing
Lateral, cylindrical
Surface

Haiku

Haiku is Japanese poetry that contains three lines and 17 syllables arranged in a 5-7-5 pattern.

The following haiku is from middle school students:

Perpendicular
Two straight intersecting lines
Forming right angles

Tanka

This is another type of Japanese poetry that contains 5 lines and 31 syllables arranged in a 5-7-5-7-7 pattern.

This is a tanka poem from a fifth grader:

Denominator
Find a common one to add
Fractions easily
The least common multiple
Is often the one you need.

Parody

A parody poem borrows its structure and rhythm from someone else. This is a student version of a poem from *Math talk: Mathematical ideas in poems for two voices*:

Addition	Addition
Start with	start with
Six	
Then add	then add
	Seven
What you are left with	
	Is 13
Which is also called	
The **unlucky** sum.	The **unlucky** sum.

Fill in the blank poems

Using parts of speech and specific guidelines students can write poems that stretch their understanding of math.

I LIKE
I like (noun)_____
Adj. _____Noun
Adj. _____Noun
Adj. _____Noun
Adj. _____Noun

Any kind of _____
I like _____
Noun _____Prep. Phrase
Noun _____Prep. Phrase
Noun _____Prep. Phrase
Noun _____Prep. Phrase
I like _____
Adj. _____Noun

Adj. _____ Noun
Adj. _____ Noun
Adj. _____ Noun
Adj. _____ Noun
Adj. _____ Noun
I like _____

An "I Like" poem from third graders:

Addition
We like addition
Easy addition
One through ten addition
Hard addition
Fat answer addition
Any kind of addition
We like addition
Addition in school
Addition at home
Addition at the store
Addition at the game
We like addition
Any kind of addition
Quick addition
Scribbly addition
Copy cat addition
Computer addition
Homework addition
Test addition
We like addition!

Definition Poem

Name it
Describe it
Tell where it would be found
Tell more about it
Use emotion words to tell how you feel about this

Explain why you used the emotion words on line 5

A definition poem from a fourth grader:

Fractions
Broken into pieces
Splitting up a pizza
Means part of the whole
Friendly, sharing work
Give me half of yours!

Poetry and math would seem to be natural partners. As students put their own words to the mathematical operations they are learning, math finds deeper meaning and poetry becomes its voice.

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