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## Literature-based language arts extended to mathematics

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## Literature-based language arts extended to mathematics

### Abstract

A literature-based language arts program provides opportunities for children to create meaning through quality literature experiences. Children's learning is integrated, and connections are made across the curriculum. The mathematics and language process are related and can be integrated into units of study through the genres of literature.

A unit of study on circles provided kindergarten children with quality literature and related expressive activities that facilitated the understanding of the concept of circle. As a result of this literature-based language arts program extended to mathematics, children's knowledge was integrated, peer interaction increased, and the reading-writing processes were connected. Children's enthusiasm for quality literature, and expressive activities through participation at centers, increased as the unit of study progressed.

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Extended to Mathematics

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## Abstract

A literature-based language arts program provides opportunities for children to create meaning through quality literature experiences. A learning environment in a literature-based program is one that supports peer interactions and nurtures language growth. Children's learning is integrated, and connections are made across the curriculum. The mathematics and language process are related and can be integrated into units of study through the genres of literature.

A unit of study on circles provided kindergarten children with quality literature and related expressive activities that facilitated the understanding of the concept of circle. As a result of this literature-based language arts program extended to mathematics, children's knowledge was integrated, peer interaction increased, and the reading-writing processes were connected. Children's enthusiasm for quality literature and expressive activities through participation at centers increased as the unit of study progressed.

An integrated school program that provides a print-rich learning environment can nurture children's literacy and appreciation of quality literature. Then, children have an opportunity to become lifelong readers and writers (Galda, Cullinan, & Strickland, 1997).

Literature is a powerful way to achieve the integration of the language arts across the curriculum (Routman, 1991). The meaning children can create is extended when themes and concepts are presented in a literature based program. Offering themes and concepts through the different genres of literature and related expressive activity can contribute to understanding their dimensions (Langer, 1995).

Frank Smith's view of education supports literature-based language arts extended across the curriculum. He states, "It is ridiculous to think that education is a matter of acquiring information--it is about life, of quality experiences and self-directed exploration." (Smith, 1994, p. 61).

#### Value of Literature-Based Language Arts

Literature-based study provides opportunities for the construction of meaning, self-directed discovery and learning, and involvement with the functions and forms of language. Literature experiences offer many ways to think about themes and concepts. A literature-based program provides a print-rich environment in which children are engaged in whole units of

language and are creating their own meaning. Children not only experience fine models of language but can be prompted to find and express their own meaning. Therefore, a natural comprehension-composition connection is made. Children's thinking-language abilities are further nurtured because they are making use of the overlaps in the comprehension-composition tasks (Harms & Lettow, 1998).

A print-rich environment that provides many options for learning needs to be predictable and secure with activities both teacher-directed and child-initiated. Such options can include learning centers that extend children's involvement with the language processes and can support students' interactions with their peers (Harms & Lettow, 1998; Galda, Cullinan, & Strickland, 1997). Through these interactions, students can explore new possibilities for meaning and can extend their capabilities as participants in a classroom community (Langer, 1995).

#### Literature-Based Language Arts Extended to Mathematics

Some elementary teachers believe mathematics should be taught as a separate subject, but an integrated program supported by literature-based language arts can promote discussion, critical thinking, and the pursuit of individuals' particular interests in the discipline (Galda, Cullinan, & Strickland, 1997). Literature experiences can assist in creating a sense of wonder as children experience mathematical concepts. Children can

encounter clever presentations of quantitative concepts and can witness story characters' experimentation with quantitative ideas (Whitin & Wilde, 1992).

The language and mathematics processes have much in common; therefore, they can be integrated into units of study. The Curriculum and Evaluation Standards for School Mathematics (K-12), by the National Council of Teachers of Mathematics (1989), issued a document that defines mathematics as a means of communication and as a language system (Thiessen, Matthias, & Smith, 1998). Mathematics language can be learned in much the same way as verbal language; both languages are learned through immersion, modeling, experimentation, and practice (Galda, Cullinan, & Strickland, 1997).

Mathematics instruction in the past has not immersed children in a learning environment that encouraged risk-taking and promoted self-realization through exploration, manipulation, and discovery. When children are provided opportunities for problem-solving that features real-life experiences and open-ended situations and are exposed to mathematical concepts in children's literature, they can begin to understand how mathematics is related to the important functions in their world (Routman, 1991).

Positive attitudes toward mathematics and fundamental understandings of quantitative concepts can be presented in

literature-based learning centers. Through playful exploration and guided manipulation of meaningful, organized materials, young children can begin to build important conceptual understandings (Henniger, 1987).

Representative Concept in Mathematics Supported  
by Literature-Based Language Arts

In pursuing the curricular concept of integration through literature-based language arts, as a kindergarten teacher, I have worked through the instructional development process and have developed the concept of a circle, a part of a unit on shapes. The concept of a circle is age-appropriate for kindergarten children because it is commonly found in many images and experiences in their lives. This concept has been presented to the children in my kindergarten classroom.

A community circle, or friendship circle, plays an important part each day in my classroom. Students are invited to gather in a circle at the beginning of the school day. We go over the day's agenda together and spend time sharing. Each child is regarded as an important, contributing member of our diverse classroom family. At the end of each day, we again gather in a circle, reflecting on the day's events and doing additional sharing. Children are exposed to the concept of a circle as being round and enclosing.

The instructional concept includes teacher-directed activities and options for student-initiated activities presented in learning centers. Sustaining centers as well as centers specific to the conceptual development of the circle are included.

### Teacher Directed Activities

The teacher presented several activities to the students. First, she read Margaret S. Reid's The Button Box (New York: Dutton: 1990), and then she led a discussion about the likenesses and differences in the shapes among the buttons in the book. After this discussion, the teacher read "Buttons" from Michael Rosen's Poems for the Very Young (New York: Kingfisher: 1993). The children noticed that many of the buttons in the illustrations were shaped like the letter "O." As a final activity, students circled the letter "O" in words of the "Buttons" poem on a chart.

Another teacher-directed activity involved the class joining hands and forming a circle. The teacher led a discussion about what a circle is and what happens when we make a circle. The idea of including everybody in the classroom family was discussed. Following this discussion, the teacher created a chart with student responses about what they can contribute to the class.

In another session, the teacher sang Raffi's song and read the book Wheels on the Bus (New York: Crown: 1988). After singing together as a class, the students listed other items that are round, such as the wheels on the bus. Students contributed ideas for new verses; for example, "the buttons on the coat are round, round, round," and "the beads on a string are round, round, round." Their responses were recorded on chart paper. Then, the teacher and students sang the new verses to the tune of this song.

The students were presented another song "My Favorite Shape is a Circle," sung to the tune of "My Bonnie Lies Over the Ocean," by Warren (New York: Warren: 1989). The teacher led a discussion about the items shaped like a circle. She listed these images contributed by children on chart paper and then, students drew pictures of the images for the chart. The teacher and students together sang their version of the song, adding each item at the end. An example is shared in the following:

Snowman, snowman,

The snowman's a circle or two or three.

Snowman, snowman,

The snowman's a circle you see. (unpaged)

(Students' suggested verse)

My favorite shape is a circle,

Because it's as round as can be,

The world is just full of circles,  
So think hard and name one for me.

After the teacher read Virginia Walter's Hi Pizza Man! (New York: Orchard: 1995), she held a discussion about foods that have circular shapes. Students then made mini pizzas for a snack using English muffin halves, pizza sauce, cheese, and pepperoni slices.

The teacher read Dayle Ann Dodd's The Shape of Things (New York: Candlewick: 1994). After she reread the story, she focused the students' attention on the page with the circle text: "a circle's just a circle, until you add some lights, chairs high and low, round and round they go" (unpaged). She had students guess what they thought the author was describing. Then, the teacher led the students on a circle walk around the school and playground having students look for circular objects. The teacher took a picture of each student beside a chosen circular object that became the subject of the stories they then wrote. A class book was made from these stories with accompanying photographs.

#### Student-Initiated Activities

In the learning centers that offered options for children's responses, literature experiences representative of the different genres and an array of expressive activities designed to enhance the conceptual development of a circle were presented. Two types of learning centers were developed. Sustaining centers were presented, offering a secure, predictable learning environment.

(Their content changed with the units.) Also, centers that focused specifically on the study of circle were offered (Harms & Lettow, 1998).

### Sustaining Centers

These sustaining centers were offered for the study of circles: Reading/Listening, Poetry, Author/Illustrator, Interesting Objects, and Bookmaking.

#### Reading/Listening Center.

These books with accompanying teacher-made cassette tapes were available in the center.

##### A. Picture Books with Circular Plots

Crews, D. (1982). Carousel. New York: Greenwillow.

Jonas, A. (1983). Round trip. New York: Greenwillow.

McDermott, G. (1972). Anansi and the spider. New York: Holt.

Numeroff, L. J. (1991). If you give a moose a muffin. Laura Gerringer.

Numeroff, L. J. (1985). If you give a mouse a cookie. Harper.

Numeroff, L. J. (1998). If you give a pig a pancake. Laura Gerringer.

Titherington, J. (1986). Pumpkin, pumpkin. New York: Greenwillow.

### B. Other Picture Books with Circular Images

- Dodds, D. A. (1989). Wheel away! Harper.
- Ehlert, L. (1990). Color farm. New York: Harper.
- Ehlert, L. (1990). Color zoo. New York: Harper.
- Falwell, C. (1992). Shape space. New York: Clarion.
- Greenstein, E. (1997). Mattie's hats won't wear that. New York: Alfred A. Knopf.
- Moncure, J. B. (1988). Apes find shapes. Chicago: Childrens.
- Moncure, J. B. (1983). Word bird's shapes. Chicago: Childrens.
- Petty, K. & Kopper, L. (1987). What's that shape? New York: Franklin.
- Price, M. (1990). Puppy round and square. New York: Harper.

### C. Concept Books

- Griffiths, R. (1994). Circles. Milwaukee: Gareth.
- MacKinnon, D. (1992). What shape? New York: Dial.
- Max, G. (1996). Circles and squares everywhere! San Diego: Browndeer.
- Pienkowski, J. (1987). Shapes. New York: Little.
- Pluckrose, H. (1995). Shape. Chicago: Childrens.
- Pluckrose, H. (1986). Think about shapes. New York: Franklin.
- Reiss, J. J. (1982). Shapes. New York: Simon.

Riggs, S. (1994). Circles. Milwaukee: Gareth.

Rogers, P. (1990). The shapes game. New York: Holt.

Roma, B. (1991). Shapes. New York: Little.

Sharman, L. (1994). Amazing books of shapes. New York: Dorling.

Smith, M. (1991). Circles. New York: Warner.

Wegman, W. (1995). Triangle, square, circle. New York: Hyperion.

Poetry Center.

Selected poems from several books were presented in the center. The teacher introduced them aloud to the students. The students were given a copy of each poem to illustrate at the center. Teacher-made cassette tapes of this collection of poems were also available in the center.

Esbensen, B. J. (1995). Dance with me. New York: Harper.

"Basketball Ballet"

"Bubbles"

Kuskin, K. (1980). Dogs & dragons trees & dreams. New York: Harper.

"Around and Around"

Levy, C. (1994). A tree place and other poems. New York:

Margaret K. McElderry.

"Moon Peach"

Livingston, M. C. (1982). Circle of seasons. New York: Holiday.

Rosen, M. (1993). Poems for the very young. New York: Kingfisher.

"Buttons"

"I Am Running in a Circle"

"The Moon"

Ryder, J. (1996). Earthdance. New York: Henry Holt.

Worth, V. (1994). All the small poems and fourteen more. New York: Farrar.

"Coins"

"Dandelions"

"Marbles"

"Pie"

"Soap Bubble"

"Sun"

#### Author/Illustrator Center.

Tana Hoban was the author/illustrator featured in the center. She has won many awards for her photography illustrations in picture books. In the center, students could listen to a teacher-made tape of a biographical sketch of Tana Hoban. Children could also listen to/read other books by the author/illustrator. The photography illustrations were discussed as a whole class.

Selected books were as follows:

Hoban, T. (1993). Black on white. New York: Greenwillow.

Hoban, T. (1974). Circles, triangles, and squares. New York: MacMillan.

Hoban, T. (1983). Round & round & round. New York: Greenwillow.

Hoban, T. (1970). Shapes and things. New York: MacMillan.

Hoban, T. (1986). Shapes, shapes, shapes. New York: Greenwillow.

#### Interesting Objects Center.

Objects of various shapes were displayed in this center for children's examination. Examples of circular-shaped objects included were pennies, nickels, dimes, buttons, bottle caps, washers, bike headlights, door knobs, and golf balls.

#### Bookmaking Center.

In this center each student assisted in designing an ABC book of circles and also a page for a class book on circles.

A. ABC Circle Book. On teacher-prepared pages, each containing a letter of the alphabet, students chose a circular object to illustrate. For example, students drew an apple on the A page and a balloon on the B page. Students put their pages together following the instructions in Harms & Lettow (1998).

B. After participating in the teacher-directed activity with the book, The Shape of Things (New York: Candlewick: 1994),

students illustrated a page of their own to accompany the photographed object they chose on their circle walk. Each page illustrated in this center went along with the text "I see a circle." Students drew a circle or a collection of circles.

### Centers Specific to the Concept Development

These literature-based centers extended the study of the concept of circle.

#### A. Fruit Sponge Painting

Goal: Students will experiment with circular shapes of fruit in creating a painting project.

Literature Experience: Ehlert, L. (1989). Eating the alphabet: Fruits and vegetables from A to Z. San Diego: Harcourt.

Expressive Activity: Students used cross sections of many circular-shaped fruits, including apples, cherries, grapes, kiwi, and grapefruit, to create pictures with paint.

Student Responses: Students discussed the different sizes of fruit cross sections as they made their pictures. Many students made patterns with color and size.

#### B. Circle Caterpillars

Goal: Students will create a caterpillar character from a children's book using circle shapes.

Literature Experience: Carle, E. (1979). The very hungry caterpillar. New York: Collins.

**Expressive Activity:** Students cut out several different colored circles from construction paper. The circles were overlapped on pieces of white paper as in the book.

Antennae, legs, and faces were drawn in to complete the caterpillar.

**Student Responses:** Students retold the story as they worked, telling which foods the caterpillar ate on which days of the week.

#### C. Number Cards

**Goal:** Students will practice number correspondence.

**Literature Experience:** Crews, D. (1986). Ten black dots.

New York: Greenwillow.

**Expressive Activity:** Students worked with ten number cards containing from one to ten dots. Numerals from one to ten were written on other index cards. Students matched the dot cards with corresponding numeral cards.

**Student Responses:** Students named each number as they matched the corresponding dot cards.

#### D. Writing

**Goal:** Students will identify, write, and draw about people who are important to them.

**Literature Experience:** Adoff, A. (1977). Make a circle keep us in. New York: Delacorte.

Expressive Activity: Students cut circles from white paper and then colored pictures on the enclosure of people they would like to invite into their circles.

Student Responses: Many students wrote simple sentences with the teacher's help to accompany their pictures. The children shared their circles in the community circle. Students asked each other questions about the people in their circles. One child suggested that the teacher display the circles in a circular shape on a bulletin board.

#### E. Circle Patterns

Goal: Students will create patterns with circles.

Literature Experiences: Hoban, T. (1978). Is it red? Is it yellow? Is it blue? An adventure in color. New York: Greenwillow.

Expressive Activity: Students cut out circles from different colors of construction paper. Patterns were created by manipulating different colors of circles in a line.

Student Responses: Many students were able to identify the color patterns they created in terms of "AB," "ABC," "AABB," "ABB," and "AAB."

#### F. Button Pictures

Goal: Students will create a storybook picture with circular shapes.

Literature Experience: Dodds, D. A. (1989). Wheel away!

New York: Harper.

Expressive Activity: Students used a variety of buttons to create circular shapes from the storybook Wheel Away!

Student Responses: Students created circles by gluing buttons on paper. A few students included a sun and flowers as a part of their button wheel pictures.

#### G. Mural Drawings

Goal: Students will work together to create a mural.

Literature Experience: Crews, D. (1982). Carousel. New York: Greenwillow.

Expressive Activity: Students used markers, crayons, and tissue paper to create a large mural of a carousel from Donald Crews' book Carousel.

Student Responses: Students commented on how well they were working together to create a carousel like the one in Crews' book.

#### H. Hat Center

1. Goal: Students will engage in dramatic play using circular hats as props.

Literature Experience: Keats, E. J. (1966). Jennie's hat. New York: Harper.

**Expressive Activity:** Students tried on a variety of hats and role played what people wearing the hats might say and do.

**Student Responses:** Students thoroughly enjoyed this center, trying on the hats, acting out roles, and talking like a person wearing the hats. For example, a boy wearing a fire hat said, "Quick! Down the pole. There is a fire at the school." He put on the fire hat, pretended to slide down an imaginary pole, then pretended to climb into an imaginary fire truck, all the while making siren sounds. The same day, a girl wearing an old hat with feathers and sequins laid out dolls from the dollhouse on chairs around a table and began pretending to serve tea and cookies.

**2. Goal:** Students will design patterned hats.

**Literature Experience:** Slobodkina, E. (1947). Caps for sale. New York: H. R. Scott.

**Expressive Activity:** After the teacher read Caps for Sale, students used colored cupcake holders to create hats like the ones in the story.

**Student Responses:** Students referred to the book to create their favorite hats. Students described their favorite hats by these characteristics: colors, stripes, and dots.

## I. Cooking Center

Goal: Students will recreate circular shapes in cookie making.

Literature Experience: Hutchins, P. (1986). The doorbell rang. New York: Greenwillow.

Expressive Activity: Students made simple no-bake cookies following a word/picture recipe and formed them into circular balls.

Student Responses: As the cookies were being formed into balls, students commented on each other's molding with comments such as, "Yours is not a circle, it's too lumpy" and "Make it more round."

### Conclusions

The children's involvement in the center activities was discussed daily by the teacher and students in the community circle. Students shared how they participated in each center and their feelings about working at that center. Student responses were positive, and sharing increased as students observed similarities and differences in their individual reactions to the center activities. Many students developed an interest in specific vocabulary and language patterns from the literature experiences. After a short time, students were sharing additional books from the school and public libraries they were reading with the concept of circle. Two students suggested we organize a

circle tub for our reading/listening center to hold the books and accompanying tapes.

Through this literature-based program, children's personal-social abilities were nurtured because they had many opportunities to interact with their peers and the teacher about their participation in the unit activities. Children shared books with each other, engaged in cooperative work at the centers, wrote about the activities in their journals, and orally reported their successes with one another on a daily basis. Conceptual knowledge in mathematics was integrated with the language processes, and the reading-writing and mathematics processes were connected.

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