

explorations math art language integrations

Asilomar Mathematics Conference
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Ten Lessons the Arts Teach

By Elliot Eisner

The arts teach children to make good judgments about qualitative relationships.

Unlike much of the curriculum in which correct answers and rules prevail, in the arts, it is judgment rather than rules that prevail.

The arts teach children that problems can have more than one solution and that questions can have more than one answer.

The arts celebrate multiple perspectives. One of their large lessons is that there are many ways to see and interpret the world.

The arts teach children that in complex forms of problem solving purposes are seldom fixed, but change with circumstance and opportunity. Learning in the arts requires the ability and a willingness to surrender to the unanticipated possibilities of the work as it unfolds.

The arts make vivid the fact that neither words in their literal form nor number exhaust what we can know. The limits of our language do not define the limits of our cognition.

The arts teach students that small differences can have large effects. The arts traffic in subtleties.

The arts teach students to think through and within a material. All art forms employ some means through which images become real.

The arts help children learn to say what cannot be said. When children are invited to disclose what a work of art helps them feel, they must reach into their poetic capacities to find the words that will do the job.

The arts enable us to have experience we can have from no other source and through such experience to discover the range and variety of what we are capable of feeling.

The arts' position in the school curriculum symbolizes to the young what adults believe is important.

SOURCE: Eisner, E. (2002). *The Arts and the Creation of Mind*, In Chapter 4, What the Arts Teach and How It Shows. (pp. 70-92). Yale University Press. Available from NAEA Publications.

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<http://www.naea-reston.org/tenlessons.html>

Four-Page Math Stories

Begin with a read aloud, then lead individuals, pairs, or groups of students through writing their own stories. Mount on construction paper and bind to publish. This works well as a one-week activity, with students working on one page a day and then finishing up and mounting the pages on the fifth day. It also works well as a collaborative activity first, as shown on the Kindergarten work pictured here.

Materials: half sheets of copy paper for pages; crayons or colored pencils; construction paper for mounting; glue

Procedure:

Page 1: Draw a picture of someone doing something. Before they start, have students give suggestions of things that people do that are not too hard to draw. If students have trouble brainstorming, give some initial ideas to get them started: play soccer; go to the grocery store; bake cookies; etc.

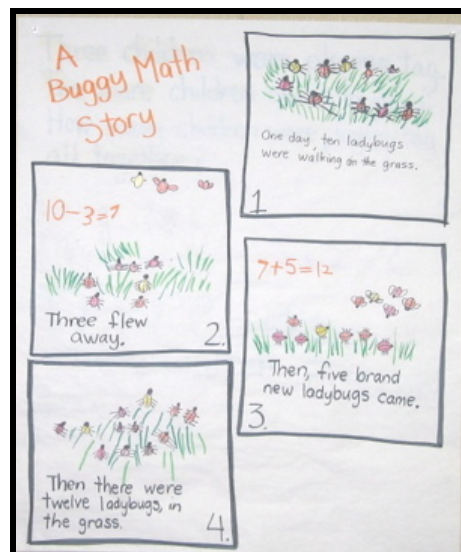
Page 2: Draw a change in quantity of something from the first page. The person can get more of something, or give something away, or need to provide for many other people or to put things into groups. Use one students' first page to give ideas for many different ways to change the quantity. Be sure to include instructions to students to keep their illustrations consistent throughout the story, with the same character wearing the same clothes and in the same location.

Page 3: Draw another change in quantity. Again, use a students' first and second pages to give suggestions as to what might be done to the quantity. Remind students about keeping their illustrations consistent.

Page 4: End the story by showing how much the character ends with.

Add text to the story after the illustrations are finished. This can be done on the same pages as the illustrations or on strips of paper that can be mounted with the corresponding illustrations. Mount on construction paper and bind into a book.

Have students read their stories aloud to the class and see if the listeners can supply the appropriate equations illustrated by the stories.



Drawing Backward Math Stories - Overview

Complete lesson plan: http://www.readwritethink.org/lessons/lesson_view.asp?id=144

Focus on the language of math and 'deconstruct' equations to turn them into stories. Begin with a read aloud, model the writing of a story, then let individuals, pairs, or groups of students write their own stories. Mount on construction paper and bind to publish.

Materials Needed:

chart paper; markers; pre-selected equations, written out on paper strips or typed in a large font; white copy paper, full or half sheets; pencils; crayons or colored pencils; construction paper for mounting

Introduction:

Read aloud a math-oriented story of your choice.

Make a chart of as many math words as you can. Post the chart in a visible place.

Whole Group Collaborative Math Story:

Model the writing of a math story by writing one with the whole class together:

Write an equation on the board. Use one that is just slightly challenging for most of the class.

Talk about the equation by asking questions, looking at each number and symbol one at a time.

What is the starting number?

Every math equation is talking about things. What things could this be?

(Allow students to give a few suggestions and then choose something to draw.)

Look at this symbol. What does it mean?

As students respond, draw and write a story on chart paper using their suggestions. Use a separate section of the chart paper for each part of the equation. The finished story will have text and drawings which represent the original equation. The equation can be used as a title for the story.

Read the story aloud with students. For younger students, use the story for shared reading.

Individual, Partner, or Small Group Stories:

Follow the same procedure as with the collaborative story. Use equations that are slightly challenging for the students. Students can work independently while the teacher monitors and assists as needed, or the entire process can be "talked through" as it was done with the whole group. Have student groups share their stories with the class and have the class guess the equation.

Shape Words

Focus on the vocabulary related to attributes of different shapes while giving students the opportunity to explore the use of color, patterns, and lines in colorful designs.

Materials: white construction paper; 9x12; large shape templates to trace; crayons

Procedure:

In a whole group generate separate lists of words that describe shapes about which students are learning.

Demonstrate the activity by drawing a square or circle on the board and writing the word itself into the shape, having all edges and ends of the each letter extending to the edge of the shape. The word itself will define the shape.

Talk about patterns and demonstrate how to fill the spaces in the “shape word” with different patterns. Patterns can be made of parallel lines, zig-zags, curved lines, dots, etc. Have students look around the room, and on their clothing, to find pattern examples.

Individually, students will do the following:

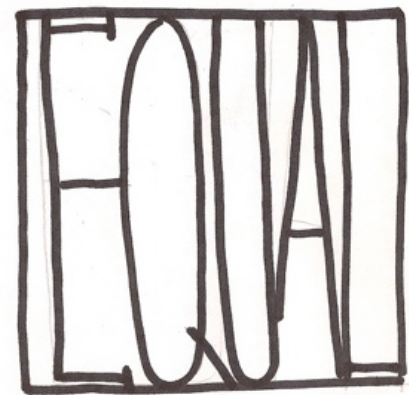
Choose a shape to trace on the white construction paper with a pencil.

Use one word from the appropriate word list. Write the word inside the shape with all letters touching the edges of the shape. Encourage students to use different words from the lists (words may need to be assigned or checked off as they are chosen).

Trace over all lines, including the original shape, with a black marker or black crayon.

Fill each closed section with a different color or pattern.

As students finish, display like shapes together in a display.



Comparing Geometric Solids

Drawing Lesson

On a table where all students can see them, stack a few various-sized boxes. On the top, place a playground ball.

Talk with students about the edges, corners, and angles of the boxes, and have them identify the source of light and the location of shadows. Then have them observe the curve of the ball and the blending of light and shadow.

Lead students through a drawing lesson in which they work slowly to recreate the angles and shapes they see on the boxes and the ball.

When drawing everyday objects, work slowly and observe carefully. Focus on lines and shapes. The trick is to draw what you actually see, rather than what you think you see.

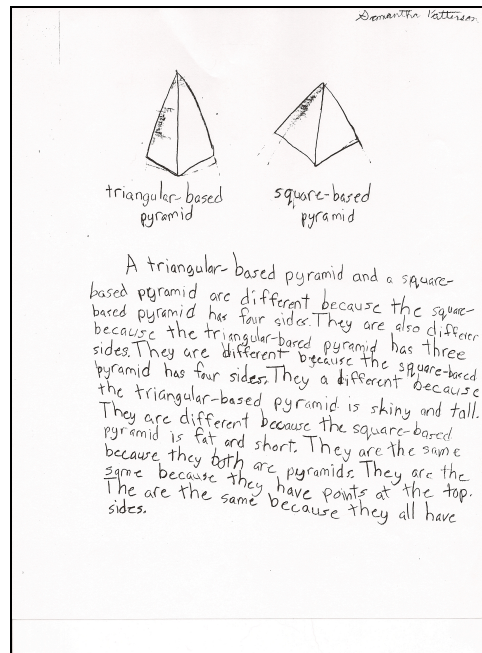
When adding shadow, use the side of the pencil point or a series of light lines.

Drawing and Writing About Geometric Solids

Select two solids that are similar in some way.

On plain white paper, draw both solid figures. Pay close attention to proportion, faces, edges, angles, and shading.

Write a paragraph describing how the solids are similar and how they are different, using appropriate math vocabulary.



Shape Poetry

Use vocabulary that describes and identifies different shapes while giving students the opportunity to explore simple poetry forms.

Choose a simple poetry form with a standard pattern, i.e., haiku, acrostic, diamante, cinquain, limerick, etc. Alternately, have students simply write a 'free verse' poem without a standard form.

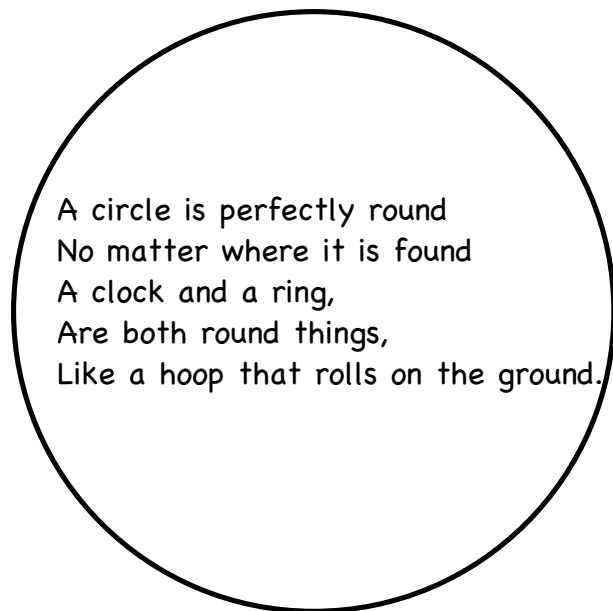
Introduce the chosen poetry form and write a collaborative poem with student participation to demonstrate the form. This can be done with a shape or an object of any kind, since it is to introduce the poetry form.

Explain to students that they will choose a shape and write a poem that describes or otherwise tells about that shape.

With students, generate a descriptive list of words that show attributes of shapes, or objects that are that shape. Allow non-mathematical words as well as math vocabulary. Create a separate word list for each shape that will be used.

Have students work individually or in groups to write another shape poem, following the criteria of the chosen poetry form.

Mount poems on colored construction paper cut to the appropriate shape. Have students read their poems aloud and then display them.



A circle is perfectly round
No matter where it is found
A clock and a ring,
Are both round things,
Like a hoop that rolls on the ground.

Poetry Forms

Acrostic

Poem created with a vertically-written word; each line begins with the appropriate letter.

Diamante

A seven line poem, shaped like a diamond when centered on a page:

line one – one word

line two – two words (adjectives that describe line one)

line three – three words (action verbs that connect to line one)

line four – four words (nouns: first two words relate to line one and second two words relate to line seven)

line five – three words (action words that connect to line seven)

line six – two words (adjectives that describe line seven)

line seven – one word (word that contrasts with the word in line one)

Haiku

Japanese form of poetry. Form is 17 syllables in three lines with pattern:

first line, 5 syllables

second line 7 syllables

third line, 5 syllables.

Cinquain

Syllabic verse form. Gradually increasing number of syllables in each line until the last line, which returns to two syllables.

Form for younger students:

First Line: 2 syllables One word, giving title

Second Line: 4 syllables Two words, describing title

Third Line: 6 syllables Three words, expressing action

Fourth Line: 8 syllables Four words, expressing a feeling

Fifth Line: 2 syllables Another word for the title.

Concrete Poem

A poem that visually takes the shape of its subject matter.

Limerick

Five line poem: Lines 1, 2 and 5 rhyme.; Lines 3 and 4 rhyme.

Teacher Resources: Math, Art, and Language

Math is Language Too: Talking and Writing in the Mathematics Classroom.

Whitin Phyllis, and David J. Whitin. 2000. National Council of Teachers of English and National Council of Teachers of Mathematics.

Lively Learning: Using the Arts to Teach the K-8 Curriculum

Crawford, Linda. 2004. Northeast Foundation for Children.

Talking, Drawing, Writing: Lessons for Our Youngest Writers

Horn, Martha and Giacobbe, Mary Ellen. 2007. Stenhouse

Creating Art With Kids

Goularte, Renee. Available from the author. Order form included and at www.share2learn.com

On the Internet

Related Read-Write-Think lessons by Renée Goularte

Draw a Math Story: http://www.readwritethink.org/lessons/lesson_view.asp?id=144

Giant Story Problems: http://www.readwritethink.org/lessons/lesson_view.asp?id=146

Seasonal Haiku: http://www.readwritethink.org/lessons/lesson_view.asp?id=39

Acrostic Poems: http://www.readwritethink.org/lessons/lesson_view.asp?id=309

Blog: Creating Art With Kids ~ <http://creatingartwithkids.blogspot.com/>

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Linking Math With Art: <http://www.share2learn.com/artmathsamples.html>

Art Work Samples: <http://www.share2learn.com/artworksamples.html>

Kindergarten Art Work: <http://www.share2learn.com/studentworkk5.html>

Math Cats: Math and Literature Idea Bank

<http://www.mathcats.com/grownupcats/ideabankmathandliterature.html>

Blog: The Miss Rumphius Effect ~ <http://missrumphiuseffect.blogspot.com/>

A teacher educator discusses poetry, children's literature and issues related to teaching children. Check the side links to extensive, thematic book lists: math-oriented lists include shapes, math poetry, and measurement.

Mathematics in Literature Booklists

Math Literature: <http://home.nyc.rr.com/teachertools/mathliterature.html>

Math in Literature: <http://nancykeane.com/rl/161.htm>

Mathematics and Children's Literature: <http://sci.tamucc.edu/%7Eeyoung/literature.html>

Math in Children's Literature: <http://literacy.kent.edu/Oasis/Resc/Educ/mathkidslit.html>

Mathematics in Literature Read-Aloud Books

For ideas with some of these math stories see <http://www.share2learn.com/mathliterature.html>

Anno's Mysterious Multiplying Jar. Mitsumasa Anno

Explores the factors of ten in a playful way.

Spaghetti and Meatballs for All. Marilyn Burns

Where will thirty-two guests sit to eat spaghetti?

Old Henry. Joan W. Blos.

The pies baked by neighbors could become a fractions, measurement, or multiplication lesson.

Benny's Pennies. Pat Brisson

Benny has five new pennies to spend and many family members telling him what to buy.

The Purse. Kathy Caple

Katie uses all her money to buy a purse.

Fish Eyes. Lois Ehlert

A good book to use when first graders are working on adding on.

The Doorbell Rang. Pat Hutchins.

This story lends itself well to measurement, multiplication, division, graphing, etc

Inch by Inch. Leo Lionni

An inchworm inches his way to safety by measuring animals.

How Big is a Foot? Rolf Myller

The king wants to give the queen a new bed, but nobody knows how big it should be.

Amanda Bean's Amazing Dream. Cindy Neuschwander

A girl loves to count things, and discovers how multiplication helps.

One Hundred Hungry Ants. Elinor J. Pinczes

The ants go marching two by two, and in other configurations.

Caps For Sale. Esphyr Slobodkina

A classic about a peddler selling his caps.

The Magic Money Box. Rozanne Lanczak Williams

A story about coin equivalents.

Alexander, Who Used to be Rich Last Sunday. Judith Viorst.

Alexander gets a small amount of money and spends a little each day.

Math Poetry

Mathemematickles

Betsy Franco

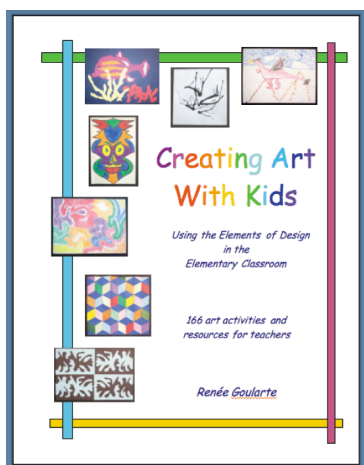
Marvelous Math

Lee Bennett Hopkins

anthology of work by many poets

**Arithme-tickle: An Even
Number of Odd Riddle-Rhymes**

J. Patrick Lewis



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