

The MATH PRACTITIONER



Published by the Adult Numeracy Network, Affiliate of the National Council of Teachers of Mathematics (NCTM), the Commission on Adult Basic Education (COABE), and Adults Learning Maths—a Research Forum (ALM)

From the President

INSIDE THIS ISSUE:

From the President	1
Highlights from ANN Annual Conference <i>Includes Student Page</i>	2
Language and Math <i>Includes Student Page</i>	4
News from Region 2: State Rep Receives Award	8
New ANN President	9
Call for Practitioner Research Project	10
ANN Board Members	11
ANN Membership Application	12

Visit our website at <http://www.adultnumeracynetwork.org/>

The Math Practitioner is a publication of the Adult Numeracy Network (ANN). We encourage submissions of articles, activities, and other items of interest related to math for adult learners. Please direct all correspondence to:

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mathpractitioner@gmail.com

Greetings Network! For some reason, I was already an involved member when I read our mission statement for the first time:

*We are a community dedicated to quality math instruction at the adult level. We **support** each other, we **encourage** collaboration and leadership, and we influence policy and practice in adult math instruction.*

I immediately thought of the support and encouragement I received from the members who first invited me to join ANN, long before I took them up on their offer to join them. I *feel* how true our mission statement is. My career wouldn't be what it is today if it weren't for their encouragement and support.

I know you folks didn't become members because you found our website. *The Math Practitioner* is a great perk, but you aren't here because of that either. You are here because another member invited you to join. Whether it was a short connection such as a conference session, or it is someone you work with, there was something about that connection that made you want to know more.

Many of you know that we (ANN) have a strong presence at the COABE conference. On behalf of ANN, I want to share a moment that happened this past year in Dallas that I treasure. A teacher who attended the numeracy strand sessions saw both Patricia, our editor, and me present our sessions. She knew we were from different states, but noticed that we clearly knew each other. She approached me while I was wearing my red COABE volunteer vest and said, "You and Patricia seem to have a connection to each other. There seems to be some kind of organization that you're both in. I want to find out more about that!"

It is wonderful to have connections to other people who think like you do about how math should be taught and who understand what you do. We're glad you've joined us. Here's my call to action: **Connect to someone else in the network or invite someone to join – help them to feel the support of other adult numeracy professionals.**

Connie Rivera

Reflections on the ANN Annual Conference at COABE 2016

By Amy Vickers, ANN President-Elect

Do you attend the national COABE conference each year? Have you ever attended the Adult Numeracy Network Preconference? This preconference has grown to become a highlight of my math professional development year. In 2016, in addition to exploring hands-on, open ended, and highly engaging activities, the preconference also offered a featured speaker, Concepcion Molina, author of [*The Problem with Math is English*](#).

Molina shared his expertise, perspective, and many examples during his morning talk. The challenge of teaching numeracy to English learners is a high-need area of professional development, so it was great to be able to listen to someone who “wrote the book” on it. During his presentation he illustrated why we need to be precise with language as well as the use of symbols in math instruction. He pointed out the [multiple meanings of words](#) that may have become “invisible” to native English speakers, but could come across as quite confusing to learners of English. He illustrated the value of working as closely as possible with actual concepts rather than just symbolic representations. I appreciated having the chance to learn from an expert in the wider math and numeracy learning community beyond adult education.

In the afternoon we focused on numeracy within the context of water conservation using the following questions to guide our exploration of water use:

How do I incorporate science into numeracy instruction?

How do I teach math in a meaningful context?

What are some activities I can use with my class of multi-level learners?



Attendees at ANN's Annual Conference enjoy a gallery walk

Conference participants engaged in the [Mathematical Practices](#) as they created graphs, wrote public service announcements, noticed and wondered about video clips, wrote questions (and answered some of them).

A favorite memory of mine from the preconference was the automatic response of teachers when the lights went out for a few minutes (in our room with no windows). Not wanting their flow to be interrupted, flashlights on phones immediately lit up each table; not even a pause was audible. (Is that more MP1: persevering in solving problems, or MP5: using appropriate tools strategically??) [Water use activity is on page 3, ready for you to try out with your class.]

I am no longer surprised by the community of thinkers, question-askers, newer and more experienced teachers, visual learners, careful workers, creative problem solvers, and thoughtful idea sharers that arrive each year for the ANN preconference. I am simply thankful to be a part of it. Looking forward to seeing you in Orlando in 2017. Bring a friend!

My Water Budget Student Activity

Objectives

1. Gain awareness of water use, especially the details about how much water each activity uses.
2. Use mathematical reasoning and communication skills to make decisions within given parameters.

Activity Instructions

Post for class:

Due to recent droughts and concerns about lack of water for the coming season, your California town has implemented water limits. Each person will be allowed 68 gallons of water for indoor use per person per day. A \$1,000 fine will be issued to any household that exceeds their limit! How will you budget your 68 gallons? Use this chart to make your plan for the week: https://www.teachengineering.org/collection/cub/_activities/cub_dams/cub_dams_lesson01_personalwaterusechart_v4_tedl_dwc.pdf. Assume the that you have a standard showerhead and toilet.

1. *Instruct students to work in pairs to complete the chart.*
2. *10 minutes into the activity, interrupt students' work and ask each pair to draw a card from the Newsflash! pile. (see below)*
3. *Instruct students to revise their plan to incorporate the information on their Newsflash! card and continue working.*
4. *When finished, discuss highlights of plans and lessons learned as a large group.*

Newsflash! cards. Print and cut out enough cards so that each pair of students can draw one.

The city leaders made a math mistake! Each person will actually only get 50 gallons per person per day for their allocation.	Your faucet started dripping! This costs you 3 gallons of water each day.	You replaced your standard toilet with a low-flow toilet	You replaced your standard shower head with a low-flow shower head.
The city leaders made a math mistake! Each person will actually only get 50 gallons per person per day for their allocation.	Your faucet started dripping! This costs you 3 gallons of water each day.	You replaced your standard toilet with a low-flow toilet	You replaced your standard shower head with a low-flow shower head.

Created by: Amy Vickers (www.elevatingadulthoodeducation.com) for 2016 ANN COABE Preconference

Language and Math

By Donna Curry

Through the years, I've heard teachers compare math and language. Some say, "Math is just another language." Others have said, "Math is not like language at all." Whether it is another language or not, understanding and using math concepts does require an *understanding* of language. It is a LOT more than just being able to read a word problem; it is about understanding conceptually what a situation requires an individual to do with math. In order to gain understanding, it is important for teachers to focus not just on the symbolic language of math but also the actual English words that can aid or hinder comprehension. Let's look at some situations where language influences math understanding.

Those Little Words

It is not just ESOL teachers who want to tear their hair out over those little prepositions. Math teachers also need to be sensitive to the power of prepositions and other little words. Simple words like *of* and *off* can throw students.

*I have a box **of** 12. This box is \$12 **off**.*

By and *into* used to drive me crazy as a young student. Oh, how I loved all the math pages where the decontextualized division problems were already laid out for me! Then, I didn't have to think about whether I was dividing *by* or *into*.

*12 ÷ 4 was a challenge for me. Does this mean 12 divided **by** 4, or 12 divided **into** 4?*

(Actually, when I first learned to divide, I still did not really have to think about whether this was *by* or *into* since I knew the rule: the smaller number always goes into the bigger number. Unfortunately, as I progressed through the grades, I soon discovered that that rule was a lie.)

Let's look at more examples with prepositions: *Ten divided **by** one-half vs. ten divided **in** half.*

Sometimes we talk about dividing things *up*. How does this compare to dividing *by* and dividing *into*? And, can you imagine the frustration for an English language learner who is asked to add *up* a column of numbers when she will probably do so by adding *down*?

Another example of those simple little words being a big challenge for students are the conjunctions *and* and *or*. Do we mean the intersection or union? Is it this **and** that, or this **or** that?

No wonder our students struggle with math—and not just ESOL students. It is important that we take time to help students conceptually see the difference between such statements. When they see the difference, math will begin to make more sense.

Confused Pairs

I always struggled with least common multiple (LCM) and greatest common factor (GCF). As long as I had an example right in front of me I could figure out what to do. And, I was good at finding those LCMs and GCFs. . . not that I knew what to do with them once I found them, but I could definitely accomplish the decontextualized task. Just like LCM and GCF, many math terms, especially when taught within the same unit of instruction, can be confusing for students. Factor and multiple, part of the LCM and GCF acronyms, seem to be particularly confusing. Horizontal and vertical, rise and run, denominator and numerator, supplement and comple-

ment, combination and permutation are some other examples. I'm sure you can think of a dozen other frequently confused pairs that we often teach together.

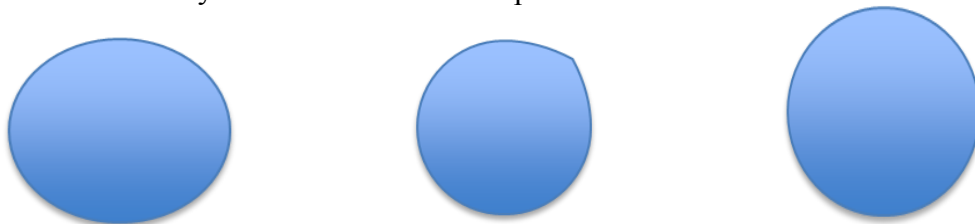
One suggested strategy is to, when possible, just teach one concept at a time, ensuring that students have the conceptual understanding behind the term before introducing the second term. This is easier to do with pairs such as factors and multiples, but more challenging with a pair such as denominator and numerator.

Another strategy is to use word origins and prefix meanings to help understand terminology. For example, the prefix *de-* often means down. You depress a clutch, you get depressed, and a denominator is the number that is down at the bottom of the fraction.

Words with Specific Meaning in Math

Another language issue with math is that many words have one meaning in everyday conversation and a different, very specific meaning for math. For example, *mean* has several meanings: not kind, intend, etc. In math, *mean* has a specific definition: it is the value of a set of numbers that has been totaled and then divided by the number in the set. (We usually know it as 'average' although average can be used to describe median and mode as well, especially in the business world.)

When I think of the word *similar*, I think of something that is sort of like something else. In math, however, *similar* has a more specific meaning. For example, in everyday conversation, I could say that the three shapes below are similar in that they all have a roundish shape.



However, in math, *similar* shapes must have the same shape. They can't be 'roundish'. They all have to be round, or square, or equilateral triangles, or whatever. There is no vagueness in the term similar in math even though in English similar we often use it to suggest vague likeness.

To help students develop specific math vocabulary, encourage them to create posters showing the term in regular English usage and then the specific math usage. Students could have a lot of fun showing the different meanings of terms such as *base*, *root*, and *product*.

Another strategy is to use the Frayer Model which is a word categorization activity. Students define a math term in their own words, then give examples and non-examples. (It is sometimes easier to give non-examples to illustrate a term.) A blank model is available on page 7 for you to use with your students.

Multiple Meanings within Math

Sometimes the same word in math can have different meanings. What comes to mind when you hear the word *round*? Did you first think about estimation? Or did you envision a circular shape? Speaking of shapes, what about the term *cube* or *square*? Are you still envisioning shapes? Or are you thinking about squaring or cubing a number? If possible, help students make the link between these terms. Square and cube are things you do to a number – which creates a square or cube (three cubed can be visualized as a cube with three dimensions).

Getting students to write in journals can help them gain clarity about the language of math. Asking students to visualize concepts allows you to see whether they really understand the terminology.

Modifying Meaning

Adjectives sometimes add little meaning to nouns. For example, a hot day vs. a sweltering day might mean a difference of a few degrees (or possibly no difference); it does not change the fact that it is still a hot day.

However, *number* can take on a completely new meaning when we add adjectives:

Whole number

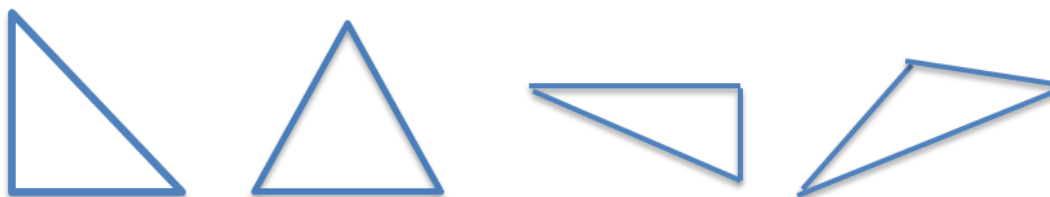
Counting number

Rational number

Irrational number

Suddenly, the set of *numbers* that we are talking about changes, sometimes quite dramatically.

A triangle might look like any of these shapes:



But, an equilateral triangle does not look like a scalene triangle. And, an isosceles triangle may or may not look like an equilateral triangle or a right triangle. Adjectives play a huge role in math definitions. Students may need to be taught to key in to, not just the nouns, but also the modifier as they construct meaning for math terms.

Word of Caution

Over time, mathematicians decide to change terminology. For example, it is now (supposedly) inappropriate to use the term ‘reduce’ when referring to fractions: you no longer reduce fractions, you simplify them. Teachers who immediately correct their learners who have been taught the term ‘reduce’ may frustrate students, especially when they are still struggling with the concept of reducing/simplifying. [By the way, reducing makes perfect sense to me: when you reduce $\frac{2}{4}$ to $\frac{1}{2}$, you are going from 2 to 1, and 4 to 2, both smaller numbers, therefore, ‘reduced’ numbers.] *Signed* numbers are no longer in vogue; it’s back to *negative* numbers. While language is important, teachers should not focus on correcting a student’s past language experiences just as he is beginning to explore a topic. It only reinforces the student’s math (and language) insecurity.

The language of math can be frustrating. As teachers, we need to take every opportunity to include vocabulary lessons along with teaching math computation and conceptual understanding. If not, our students may come to continue to believe that all of math is irrational, not just some numbers.

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Rubenstein, Rheta N. (2007). Focused Strategies for Middle-Grades Mathematics Vocabulary Development in *Mathematics Teaching in the Middle School*. 13 (4), 200–207.

Definition	Facts/ Characteristics
Examples	Nonexamples

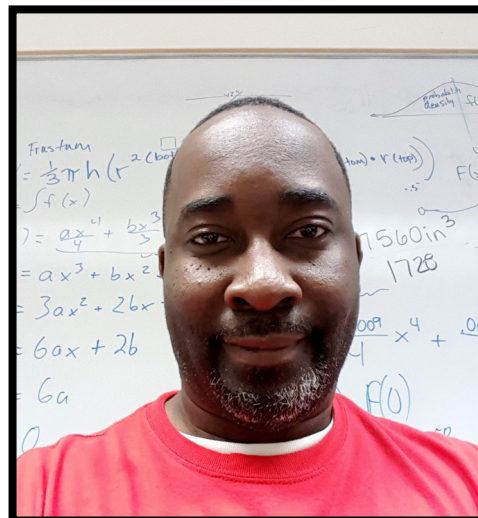
Adapted from *Building a Bridge to Academic Vocabulary in Mathematics*

News from Region 2:

ANN State Rep Receives Award

Christopher Kees, ANN's state rep for Louisiana, was selected as *Teacher of the Region* after being nominated by the education director of the Department of Corrections in Louisiana. The board of Region 5, which includes the states of Arkansas, Texas, Oklahoma, and Louisiana, believed he would be the best candidate to represent Louisiana. (These are not to be confused with ANN's four regions.)

He received his award at the 71st CEA (Correctional Education Association) International Conference and Training Event that took place in California from July 30-August 3, 2016. The award is given to an outstanding teacher whose classroom presence and instructional strategies reflects the Department of Corrections goal of reducing recidivism.



He explains how his connection with ANN has contributed to his success in working with students and in training tutors to provide effective instruction for students:

ANN workshops have encouraged me to continue to look for ways to make learning relevant in class; the workshops revitalized my efforts to doing so. In my experience with working with adults, they want to know why they are doing it and how can they use it in real life. We also created physical models to manipulate when searching for the angle or the length of a side. I use a lesson using the Pythagorean theorem and the six trigonometric functions for right angles to find the angles and height of people and other objects. Many of the old students commented that they finally understand why they were applying Pythagorean Theorem, its limitation, and how the six trig functions pick up where the Pythagorean Theorem leaves off.

His work exemplifies how putting the [ANN Teaching and Learning Principles](#) into action can have a significant impact on students and colleagues alike. Congratulations to Christopher from all of us in the ANN network for your success!

Christopher's enthusiasm for ANN is evidenced in this t-shirt that he designed for advertising ANN in Louisiana.



New ANN President: Connie Rivera

Connie Rivera has taught basic skills and prepared adults for high school equivalency since 2002. Her background in special education has well prepared her for teaching a wide variety of learners. As a [YouthBuild, USA](#) Teacher Fellow from 2013 – 2014, Connie developed a unit of instruction later rated as an Exemplar and posted at [EQuIP](#).



She also works as a math consultant in her home state of Connecticut, providing training and support to teachers implementing the College and Career Readiness ([CCR](#)) Standards for Adult Education. Through TERC's [Adult Numeracy Center](#), Connie is also a [SABES PD Center](#) consultant in Massachusetts where, among other things, she writes for the Adult Numeracy Center [blog](#). As a consultant in New England and elsewhere, she develops and presents webinars, presents at conference sessions, and facilitates face-to-face adult numeracy courses. At her face-to-face sessions, Connie is known to offer stations that allow participants to deepen their understanding and experience something they can use in class.

In addition to teaching adult students and providing professional development to teachers, Connie blogs for [Tech Tips for Teachers](#).

Connie is proud to serve as president of the Adult Numeracy Network!

Join us at the ANN ANNUAL Conference!

April 2, 2017

COABE National Pre-Conference



Practitioner Research Project

The Adult Numeracy Network (ANN) will sponsor two practitioner research projects to begin this fall and conclude before our annual meeting next spring. We would like practitioners to familiarize themselves with the ANN Teaching and Learning Principles and base their research project on some aspect of these principles. Selection of projects will be based on how well the practitioner follows the four components for practitioner research listed below and utilizes an idea(s) from the [Teaching and Learning Principles](#).

Four Components of Practitioner Research

- **Identify the question to be researched**

What aspect of the ANN principles are you investigating? "What is going on?" or "What happens when...?" or "How do I help students...?" Make sure your question allows you to collect data to answer your question and applies to the Teaching and Learning Principles.

- **Discuss how you will collect data to answer the question**

How will you gather information to answer your question (survey, testing, interview, observation, focus group, etc.)? Will it be quantitative (numbers, i.e., math scores to show demonstration of learning) or qualitative (case study)?

- **Analyze and interpret the data**

What will you do with the data that you gathered? What did you find out? What's the answer to the question? What does this mean for your teaching practice?

- **Share the findings**

Write an article for *The Math Practitioner* based on your research project. If possible, share your project at the ANN annual conference the following spring.

If interested, please submit your proposal electronically (preferred) to the Adult Numeracy Network (annpractitionerproject@gmail.com) or a send hard copy to:

Libby Serkies
1113 W Jackson Street
Bloomington, IL 61701

Each year, the deadline for submission is October 31. Two practitioners will be selected and each will receive a \$500 stipend at the completion of their projects and sharing of their findings. Selected practitioners will be asked to join ANN if they are not already members.

ANN Board Members 2016-2017

The ANN Officers and Committee Chairs for 2016—2017 are as follows:

President: Connie Rivera (CT) con2ward@aol.com	President-Elect: Amy Vickers (MI) amyjvickers@gmail.com
Secretary: Pam Meader (ME) mdr151@aol.com	Treasurer: Lynda Ginsburg (PA) ginsburg@rci.rutgers.edu
NCTM Rep: Cynthia Bell (NY) cynthiab@lacnyc.org	Newsletter Editor: Patricia Helmuth (NY) mathpractitioner@gmail.com
Past President: Sally Waldron (MA) sally_waldron@worlded.org	Webmaster: Brooke Istas (KS) brooke.istas@cowley.edu
Practitioner Research Chair: Libby Serkies (NV) annpractitionerproject@gmail.com	

Call for ANN State Reps

The following is a list of ANN regional representatives. If you would like to get more involved in ANN and live in a USA state or territory that is listed below in **RED**, please contact your regional representative, via the email address provided below, for information on how you can become a state rep.

Region 1: Patrick Cavillion pcravillion@schools.nyc.gov CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, PR, RI, VT, VI	Region 2: Heidi Schuler hschuler@ellijay.com AL, AK, FL, GA, KY, LA, MS, NC, OK, SC, TN, TX, VA, WV
Region 3: Brooke Istas istasb@cowley.edu IL, IN, IA, KS, MI, MN, MO, NE, ND, OH, SD, WI, WS	Region 4: Tom Brewer tbrewer@sanjuan.edu AL, AS, AZ, CA, CO, GU, HI, ID, MP, MT, NV, NM, OR, PW, UT, WA, WY



ADULT NUMERACY NETWORK

MEMBERSHIP APPLICATION FORM

Please help build membership in ANN. Pass this membership form along to another numeracy practitioner/ adult ed math teacher.

(Please Print)

Name: _____ New Member ☐ Renewal ☐

Email (please complete): _____

Check preferred mailing address: Home address ☐ Work address ☐

Institution: _____

Street: _____

City: _____ State: _____ Zip: _____

Work phone: _____ Fax: _____

Job Title: _____

Street: _____

City: _____ State: _____ Zip: _____

Home phone: _____

Are you a member of the National Council of Teachers of Mathematics? Yes ☐ No ☐

Are you a member of COABE? Yes ☐ No ☐

Annual Dues for ANN Membership:

[] Individual Membership – (circle one) **1 year for \$15** **2 years for \$25** **3 years for \$30**

[] Group Membership – (circle one) **up to 15 members for \$150** **up to 30 members for \$290**
(form with contact information must be sent for each member)

[] Lapel pin: \$3 each

Amount enclosed: \$ _____ Date: _____

Make checks payable to the **Adult Numeracy Network**. Mail to:

Lynda Ginsburg
1904 Sylvan Terrace
Yardley, PA 19067