

Making Multimeaning Words Transparent in the Math Classroom

by Lisa Meyer—Director of Instructional Equity, Dual Language Education of NM
and Erin Mayer—Developer, AIM4S³™ Math Framework

Have you ever been giving a short-cycle assessment and had a student ask you this type of question? “Maestra, what does *product* mean? Does it mean like shampoo?” Or, as you are walking around proctoring your state exam, you see that a student has read the directions, “Draw a table to find the answer” and is literally drawing a sketch of a kitchen table. You know the students can do the math, but they are going to get the answer wrong because they don’t know the vocabulary, and you can’t give them any help. In both situations, these words have a specific mathematical meaning as well as another meaning that we use in everyday contexts outside of math class.

As a math educator who has spent much of my career looking at how we give multilingual learners access to grade-level content, I’m amazed at how often I use vocabulary with students and don’t recognize that the word has multiple meanings that could confuse my students. I’m knee-deep into a carefully planned math lesson on expressions, equations, and formulas, and I have students who are lost wondering what baby formula or facial expressions have to do with seventh-grade math!

Conversation with other teachers have led me to believe that I’m not the only one with this challenge. Recently, a colleague shared with me that she had been in a seventh-grade math class where students were working on balancing equations. The teacher commented to her, “Today they are struggling, and I’m not sure why. They had this yesterday.” My colleague observed one

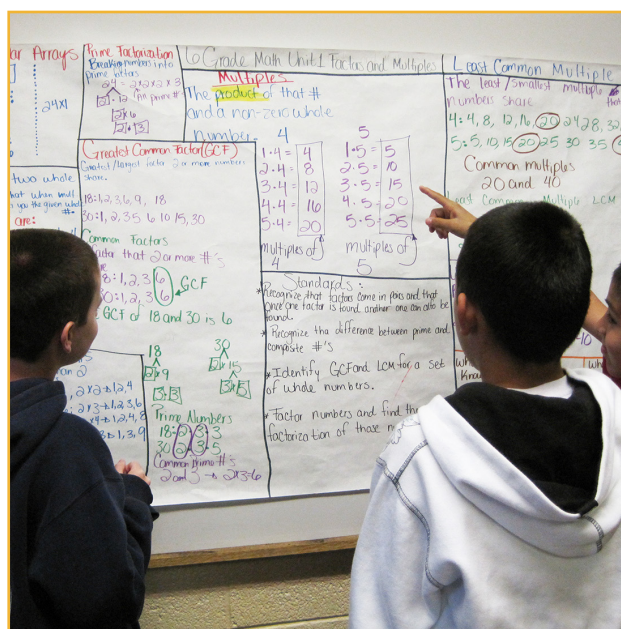
of the groups that had not begun their work and asked if they understood what they needed to do. One of the students pointed to the words *make up* and said they didn’t understand what it meant. My colleague asked them to define *make up*. One student said *maquillaje* or makeup in Spanish. Another replied, “My sister wears makeup” and made a facial expression showing he didn’t know

how this made any sense with their math lesson. A third student touched her face and modeled putting makeup on. None of these multilingual learners understood that they needed to *make up or create* their own mathematical example.

As teachers, the more aware we become of multiple-meaning words in the math classroom, the more transparent we can be in our instruction with students. As we highlight these types of words, students become more comfortable asking

questions when a word doesn’t make sense and helping us to identify vocabulary that needs to be clarified or directly taught.

On the next page is a chart of ten terms we routinely use in the math classroom that have multiple meanings. The meanings listed capture the big idea of the math term without getting into technical definitions. This is not an all-inclusive list so some of the words have additional everyday meanings or uses that are not included here. As you read the list, consider how these terms might confuse students and disrupt their mathematical thinking.



Teaching students the multiple meanings of math terms prepares them to navigate math lessons and the world outside of the classroom.

—continued on page 5—



Chart of Multiple-Meaning Math Vocabulary Examples

| Term | Mathematical Meaning | Real-Life Mathematical Context | Everyday Meaning(s) | Everyday Example(s) |
|------------|--|---|---|---|
| area | the space inside a plane figure or region that can be measured by square units | If you call me with the <i>area</i> of your kitchen floor, our office manager will order the tile you need. | a space or region | Get out of my <i>area</i> ! This <i>area</i> of the playground is for kindergarten students. |
| cup | a unit of measurement for capacity/volume that equals 8 ounces | I need to use two and a half <i>cups</i> of flour in this cake recipe. | <ul style="list-style-type: none"> •a container that we often drink out of that can have different shapes and sizes •a protective device worn in sports to protect a man's genitals | <p>I would like a <i>cup</i> of coffee, please.</p> <p>My brother wears a <i>cup</i> when he plays football.</p> |
| degree | the unit of measurement for angles and temperature, normally expressed with the ° symbol | <p>If your daughter has a temperature over 100.4°F, you will need to pick her up from the nurse's office.</p> <p>The carpenter made 90° angles in all four corners before she installed the new window.</p> | <ul style="list-style-type: none"> •awarded by a college or university for completing undergraduate or graduate studies •intense questioning of someone to find out as much as you can •way to rank a person's level in martial arts | <p>I graduated from UNM with a <i>degree</i> in criminal law.</p> <p>When my sister got home two hours late, my dad gave her the third <i>degree</i> about where she was.</p> <p>I'm testing for my first-<i>degree</i> black belt in karate.</p> |
| even | a number divisible by 2 | You need an <i>even</i> number of chocolate bars so everyone can have 2. | <ul style="list-style-type: none"> •have it fair for both sides •a flat surface •surprising or unexpected | <p>We will not be <i>even</i> until you repay my visit.</p> <p>My uncle built his house on <i>even</i> ground.</p> <p>I'm surprised that my uncle is <i>even</i> here! I didn't expect him to show up for the party.</p> |
| expression | a mathematical description of what is occurring using numbers and symbols | A carpenter uses the <i>expression</i> length x width to determine the number of materials needed for a project. | <ul style="list-style-type: none"> •something we commonly say •how we show emotion on our face | <p>The <i>expression</i> "the early bird gets the worm" always reminds me of my childhood.</p> <p>The <i>expression</i> on your face is priceless!</p> |
| fraction | represented by values like $\frac{1}{2}$, $\frac{1}{4}$, or $\frac{3}{4}$ as a way to represent equal parts of a whole | What <i>fractional</i> amount of tint did you add to the paint to color it for the customer? | •a portion of something | Juan spent a <i>fraction</i> of the time he was supposed to doing his homework. |





—continued from page 5—

| Term | Mathematical Meaning | Real-Life Mathematical Context | Everyday Meaning(s) | Everyday Example(s) |
|-----------|--|---|--|---|
| operation | a procedure or function that produces a new value using addition, subtraction, multiplication, division, or another math operation | What <i>operation</i> did you use to format the Excel spreadsheet to show the quantities purchased? | <ul style="list-style-type: none"> • a surgery performed by a doctor • a highly organized activity that involves many people doing different things | <p>My aunt had an <i>operation</i> to have her appendix removed.</p> <p>The rescue <i>operation</i> began on Sunday.</p> |
| product | a result of multiplying factors | I calculated the <i>product</i> of the prices and quantities to determine the total cost of the items in my shopping cart. | <ul style="list-style-type: none"> • things for sale on the rack or shelves of a store • the results of someone's efforts | <p>My favorite hair <i>product</i> is made by L'Oreal.</p> <p>A good report card is the <i>product</i> of your hard work.</p> |
| table | the organizer to demonstrate a pattern of relationship between quantities | We used a <i>table</i> to report to the board the cost/profit relationship for buying t-shirts from six different distributors. | <ul style="list-style-type: none"> • a piece of furniture with a level surface commonly used to eat or work on • to postpone a conversation or vote • an organizer used to display information (ex. state population, political representatives, nutritional value of food, etc.) | <p>We need a new dining room <i>table</i>.</p> <p>We had to <i>table</i> the idea until next month's meeting.</p> <p>I checked the nutritional <i>table</i> to find out how much sugar was in each serving of cereal.</p> |
| volume | the amount of space a three-dimensional object occupies | To survive in captivity, bull sharks need a tank with a <i>volume</i> of at least 250,000 gallons of water. | <ul style="list-style-type: none"> • a mass or quantity • a degree of loudness, how loud something is | <p>The local newspaper receives a large <i>volume</i> of mail every Tuesday.</p> <p>Please turn the <i>volume</i> down on the TV.</p> |

Strategies to Support

As we increase our awareness of these terms that have multiple meanings, we can be intentional in our instruction to minimize confusion during our lessons and on assessments and make the language transparent for our students. Below are a few strategies that support students in understanding multiple-meaning words and learning their mathematical definitions.

Highlight multiple-meaning words in lessons

This can be done by highlighting for students orally or in writing when multiple-meaning words come up in lessons. Consider this word problem

in i-Ready from the explore session of the fifth-grade unit on volume. What multimeaning words would you circle and discuss with your students? Is there other language that would be important to talk about?

As math language teachers, we need to make sure we highlight the math meaning as well as take advantage of this opportunity to highlight everyday meanings for the word. In the example above, we would of course want to talk about volume as well as other possible meanings of the word -model. Highlighting this type of language will expand students' vocabulary and help them

—continued on page 11—

—continued from page 10—

understand words in multiple contexts. If you make looking at language a regular part of your lesson, students will help you spot challenging vocabulary and will start asking what words mean when they don't understand them.

Have students be word detectives

Start a chart on the wall and have students write down multiple-meaning words when they find them. This chart can be large and visual or quite simple, with students using post-it notes to write what they find. The goal is for students to be word detectives with you.

Include student-friendly math definitions when charting

Charting concepts in math can build a powerful class reference tool for students to refer to during lessons. Charting teaches notetaking skills and provides additional support for multilingual learners and students who struggle with math.

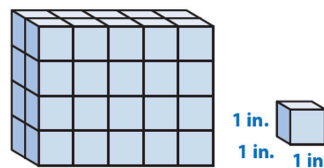
When charting, be sure to embed key vocabulary with short student-friendly definitions and visuals. Charting, as opposed to a word wall is recommended because students are present when the chart is built and can see the words and visual representations in the larger context of what you are studying. The chart is available to students to use as a reference during daily lessons. For example in the chart to the right, there are student-friendly definitions included for area, volume, and plane that have been color-coded to sketches or drawings that illustrate the concepts.

In conclusion

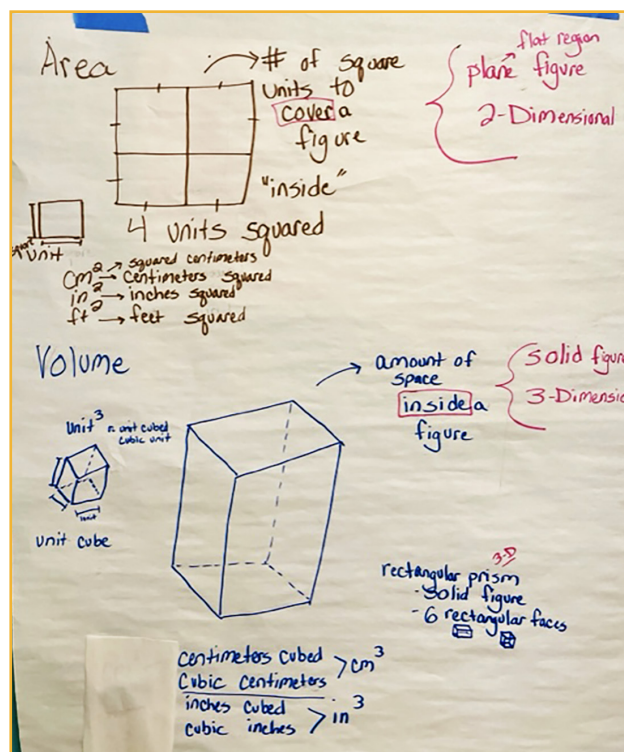
Increasing our awareness of multiple-meaning words and highlighting them in our math instruction will support students in interpreting this language in math class, in social contexts, and in situations where they are applying math concepts outside of school. Students will recognize that on a math test, they need to draw a table to solve a problem while at lunch or in class they sit at a table to have a flat space on which to eat or work.

TRY IT Make sense of the problem

Becky uses 1-inch cubes to create a model for a small paper gift bag she is making. Her model is a rectangular prism. What is the volume of Becky's model?



From i-Ready Classroom Common Core (2020),
5th Grade Unit 1, Session 1



This is an example of an area and volume chart that has been created in front of students.

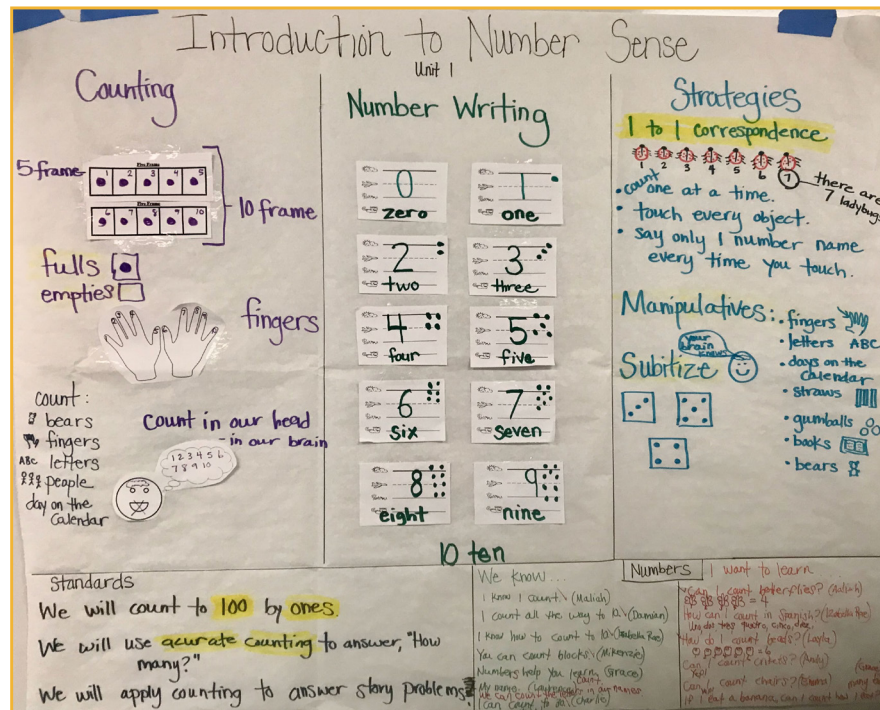
Awareness and command of this language are crucial for students to successfully navigate their world. We as teachers can help set them up to be able to do this.

—continued on page 12—



—continued from page 11—

Look at these Compendiums, a strategy that is part of the Achievement Inspired Mathematics for Scaffolding Student Success (AIM4S^{3™}) Framework that provides teachers with the tools to make math instruction comprehensible for all students. Compendiums are class resource charts that are built with students to support their understanding of content and language during a math unit. How many multiple-meaning words can you find in each Compendium?

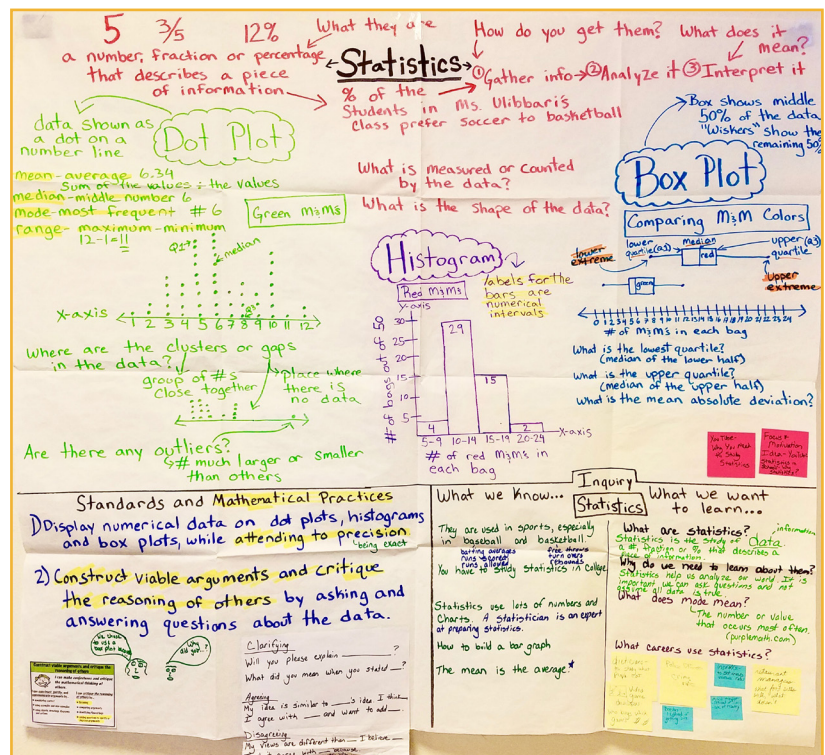


Kindergarten: Introduction to Number Sense

Multimeaning Math Word Challenge

Help us build a resource to support math educators in identifying math terms that have multiple meanings in different contexts. Use the QR Code or link below to share words your students find confusing or challenging. We'd love to hear anecdotes from your classroom with examples in English, Spanish, or other instructional languages. We'll share them on DLeNM's social media or in future Soleado newsletters.

<https://bit.ly/3tCvNOQ>



Sixth Grade: Statistics

For more information about the AIMS4S^{3™} Framework, please [click here](#).