Fractions, Factors and Functions, Oh My! Are My ELs Attaching Meaning to Math Words?

What We Know About How Students Learn Specialized Words

When you think of “mathematics and language,” words such as Hypotenuse, Polygon, Polynomial, Function, Set, Factor, and so on might come to mind. Specialized words and special ways of using those words are two of the distinguishing characteristics of mathematical language. For mathematics teachers of English Learners, one common question is when and how should I introduce the specialized words that are part of mathematical language?

There is not a “one-size-fits” all answer to this question and the ELSF guidelines do not include specific guidance on how to introduce vocabulary. Instead, the ELSF guidelines highlight that curriculum materials and guidance for teachers should include activation of prior knowledge and hands-on applications to “help students make connections between current language, new language, and mathematical concepts.”

Based on the research and ELSF guidelines, we suggest the following:

| **DO** | | **DON’T** |
|---|---|
| Activate prior knowledge by giving students an opportunity to share their current mathematical vocabulary and understanding of related concepts at the beginning of a new unit of investigation. Note: This helps teachers assess students’ current knowledge, as well as connect new concepts and language to what students already know. | Don’t make lists of keywords without context. This is common in many old textbooks where all of the keywords for a section or chapter are in bold on the front page of the chapter. |
| Give students the opportunity to talk about mathematics informally before encouraging all students to use formal language. | Don’t ask students to recite words without context. This can teach pronunciation without meaning, which is not very useful. |
Suggestions for Routines that Support Mathematical Language Development

Try using one of the Understanding Language/SCALE Math Language Routines*, such as Collect and Display. According to Zwiers et al. the purpose of Collect and Display is “to stabilize the fleeting language that students use in order for their own output to be used as a reference in developing their mathematical language. The teacher listens for, and scribes, the language students use during partner, small group, or whole class discussions using written words, diagrams and pictures... Throughout the course of a unit, teachers can reference the displayed language as a model, update and revise the display as student language changes, and make bridges between student language and new disciplinary language (p. 11).

Example: During a curriculum unit on doing arithmetic with multi-digit numbers using place value, a teacher might share an image of base 10 blocks and ask students to identify each piece. The teacher writes down the students’ informal language to describe the difference between the units, tens, and hundreds pieces. Students might, for example, talk about the number of squares in each figure, the shape (rectangle or square) and the lengths of the sides. This student-generated language can be scribed and then the teacher can use this informal language and the images of the base ten blocks as resources for developing formal terms such as dimensions, area, and square unit.

Endnotes

2. ELed has developed research- and EL expert-informed Guidelines for Improving Math Materials for English Learners that are freely available on our website.