Do's & Don'ts

of EL Instruction

ENGLISH LEARNERS SUCCESS FORUM

GRADES K–12

GUIDELINE KEY	SUBJECT	AREA OF FOCUS	GUIDELINE	SPECIFICATION
This resource is related to the following ELSF Guidelines:	MATH	I	1	1C

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[1]. 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[2] 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."**[3]

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

DO	DON'T
Do 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.
Do 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.

Featured Authors

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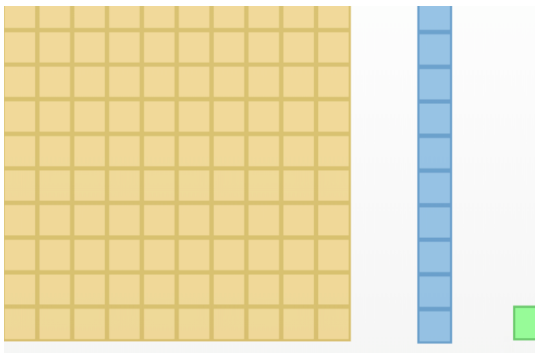
DO	DON'T
Do engage all students in rich mathematical experiences worth communicating about, and ask open ended questions that invite students to produce extended answers and to use mathematical vocabulary in a meaningful context.	Don't pre-teach vocabulary that is part of the core mathematical focus of a lesson without explaining it or making connections to prior learning. It is very likely that students will write notes down, yet not make sense of the language if connections are not made explicit.
Do provide supports for students to connect and formalize their language. For example, use visual organizers, Frayer models, sentence frames, matching activities.	Don't treat academic vocabulary development as a practice separate from mathematical content.
Do create shared representations of new words in public places (e.g. on a co-constructed word wall).	Don't expect a classroom word wall to be useful unless students are actively involved in its creation and continued use.
Once students have developed an understanding of new terms and concepts, do continually provide opportunities for students to use this new vocabulary when explaining their ideas verbally and in writing.	

Suggestions for Routines that Support Mathematical Language Development

Try using one of the Understanding Language/SCALE Math Language Routines[4], 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



For an overview of the series, see Do's & Don'ts of EL Instruction. It is recommended that these practices be part of a comprehensive approach to EL instruction and not in isolation as laid out in our Guidelines for Improving Math Materials for English Learners.

Endnotes

1 References: Moschkovich, J. (2007). Using Two Languages When Learning Mathematics. Educational Studies in Mathematics, 64(2), 121-144. https://doi.org/10.1007/s10649-005-9005-1; Pimm, D. (1987). Speaking Mathematically: Communication in Mathematics Classrooms. New York: Routledge & Kegan Paul.

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

3 References: Reder, L., Liu, X., Keinath, A., & Popov, V. (2015). Building knowledge requires bricks, not sand: The critical role of familiar constituents in learning. Psychonomic Bulletin & Review, 23(1), 271-277. https://doi.org/10.3758/s13423-015-0889-1; Sidney, P. & Alibali, M. (2015). Making Connections in Math: Activating a Prior KNowledge Analogue Matters for Learning. Journal of Cognition and Development, 16(1), 160-185. http://dx.doi.org/10.1080/15248372.2013.792091; Spires, H. A., & Donley, J. (1998). Prior knowledge activation: Inducing engagement with informational texts. Journal of Educational Psychology, 90(2), 249-260. http://dx.doi.org/10.1037/0022-0663.90.2.249

4 Reference: Zwiers, J., Dieckmann, J., Rutherford-Quach, S., Daro, V., Skarin, R., Weiss, S., & Malamut, J. (2017). Principles for the Design of Mathematics Curricula: Promoting Language and Content Development. Retrieved from Stanford University, UL/SCALE website: http://ell.stanford.edu/content/mathematics-resources-additional-resources