Strategies to Support the English Learners in the Mathematics Classroom

Sandy Szako, M.Ed
Resource Advisor
s_szako@origomath.com

Andrea Kotowski
Learning Services Educator
a_kotowski@origomath.com

www.origoeducation.com

Learning Goals

Participants will understand that…

- supporting ELLs in the mathematics classroom requires an understanding of language development
- student discourse plays an integral role in developing social and academic language

Participants will know…

- the 5 Guiding Principles for supporting ELLs in the mathematics classroom

Participants will be able to…

- plan and modify math instruction to better meet the needs of ELLs in the mathematics classroom

What do you hope to learn as a result of this professional learning session? Write a learning goal.

_____

_____

_____

_____

_____

Guiding Principles

Principle 1: Give ELLs many opportunities to **read**, to **write**, to **listen** to, and to **discuss** oral and written English and mathematics texts expressed in a variety of ways.

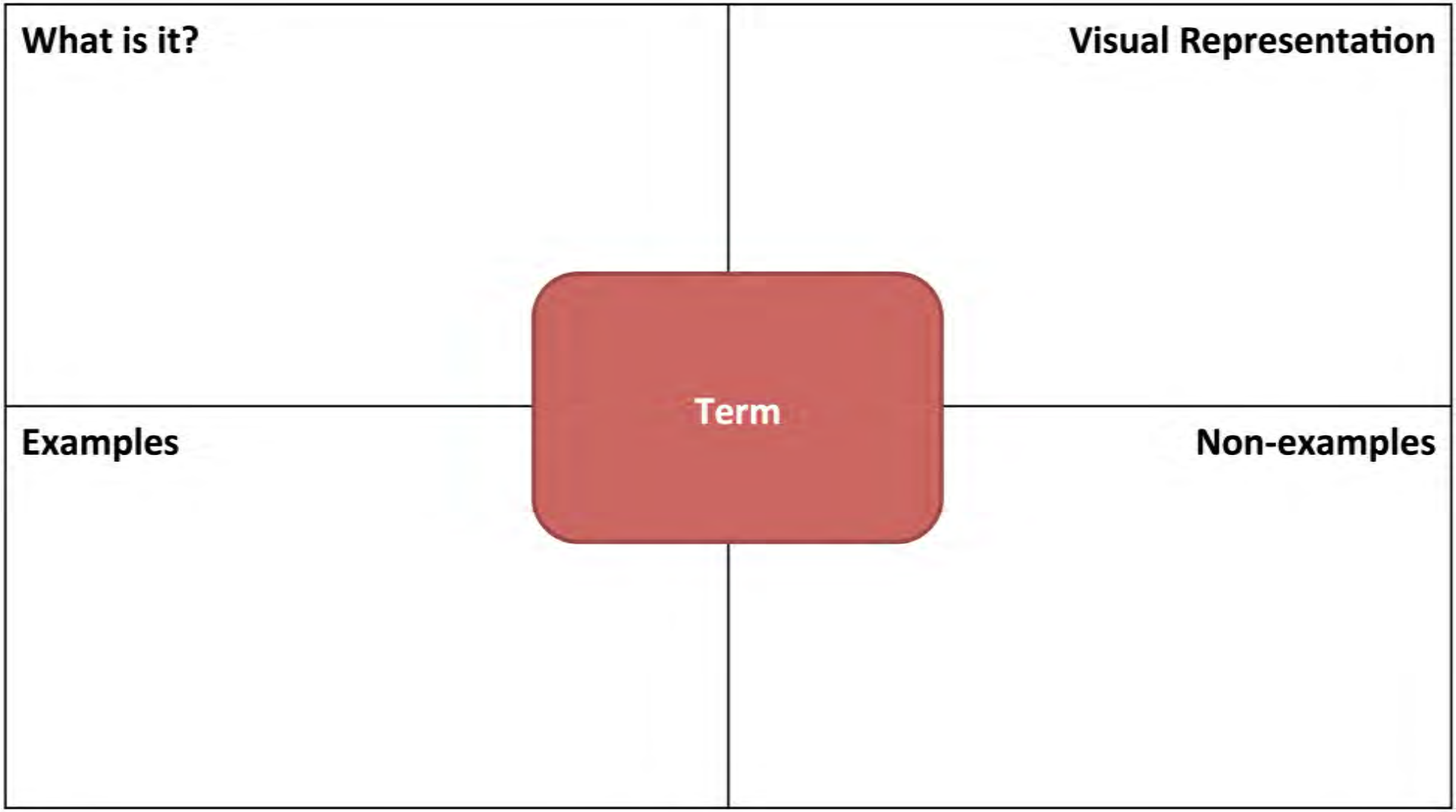
Principle 2: Draw attention to **patterns** in English and mathematics **language structure**.

Principle 3: Give ELLs **classroom time** to use their English productively while learning mathematics.

Principle 4: Give ELLs opportunities to **notice their errors** and to **correct their English** while learning mathematics.

Principle 5: Construct activities that maximize opportunities for ELLs to **interact with others** in English.

Frayer Model



Think and Solve

For each square, add the numbers in the shaded boxes to figure out the **magic number**.

Complete each magic square.

a.

16		14
12	17	10

b.

6	11	
	7	9
10	3	

In a magic square, the three numbers in each row, column, and diagonal add to make the same number. This is called the **magic number**.

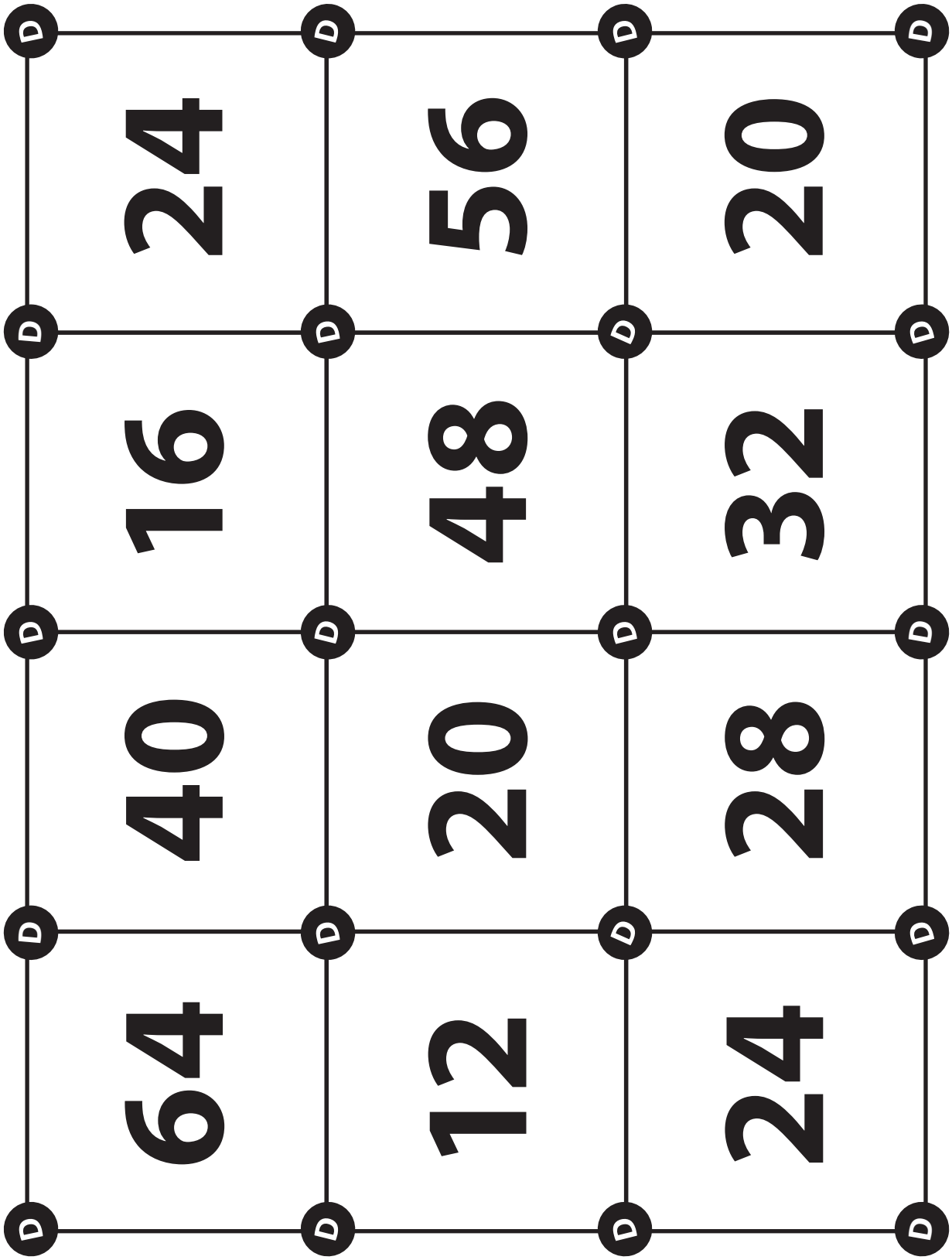
Words at Work

Write in words how you can solve this equation on a number line. You can use words from the list and draw a diagram to help.

216 + 38 = ?

jump
total
hundreds
tens
ones
add
sum

Do the Ds



Cube 1: DD, DD, DD, DDD, DDD, DDD

Cube 2: 3, 4, 5, 6, 7, 8

How could we figure out the total cost of both items of clothing?

Two friends show the position of different numbers on a number line. They notice that their numbers are each an equal distance from 60. What numbers could they have shown?

Problem Solving Strategies

3 Reads Strategy

What is the action or situation taking place?

What are the quantities in the problem?

What questions might you ask about the problem?

Numberless Word Problems

George Pólya's four phases of problem solving

Understand-Plan- Solve-Review

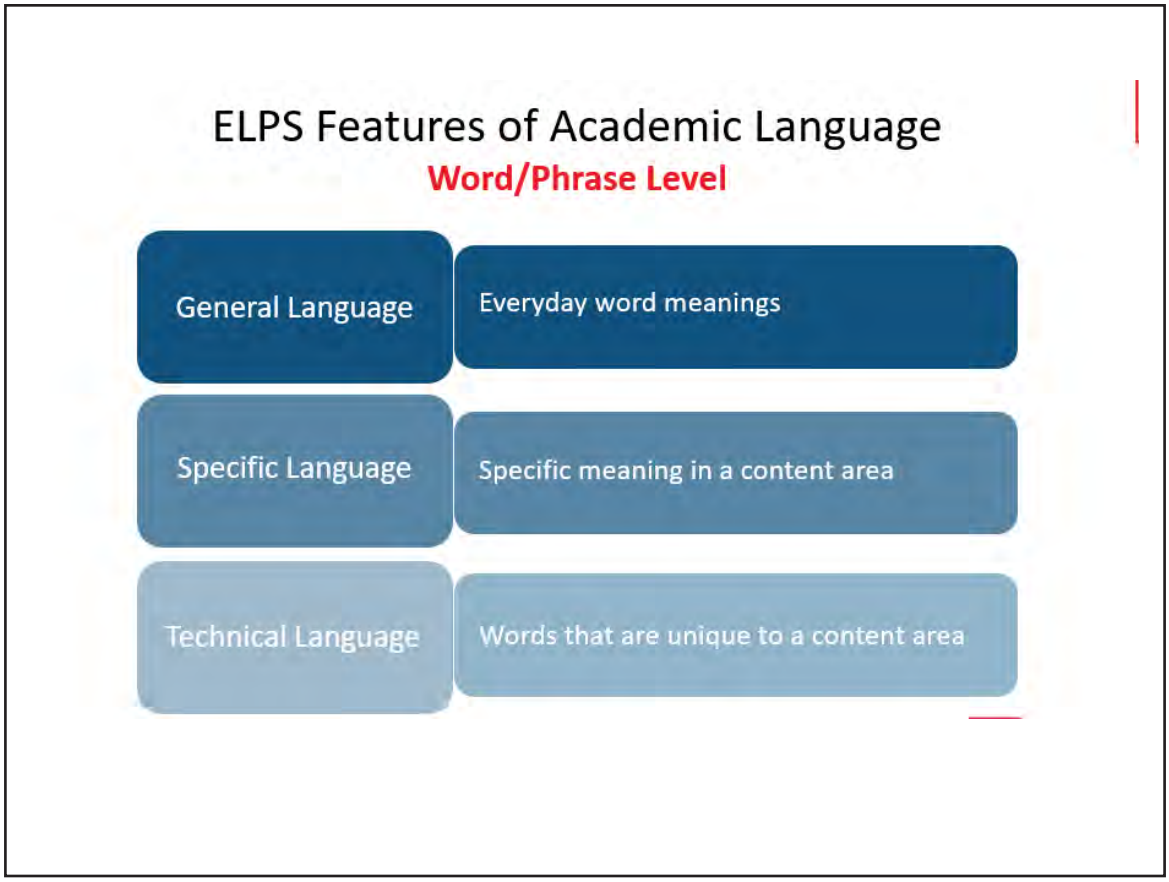
3 Read Strategy: http://www.sfusdmath.org/3-read-protocol.html

Numberless Word Problems: https://bstockus.wordpress.com/numberless-word-problems/

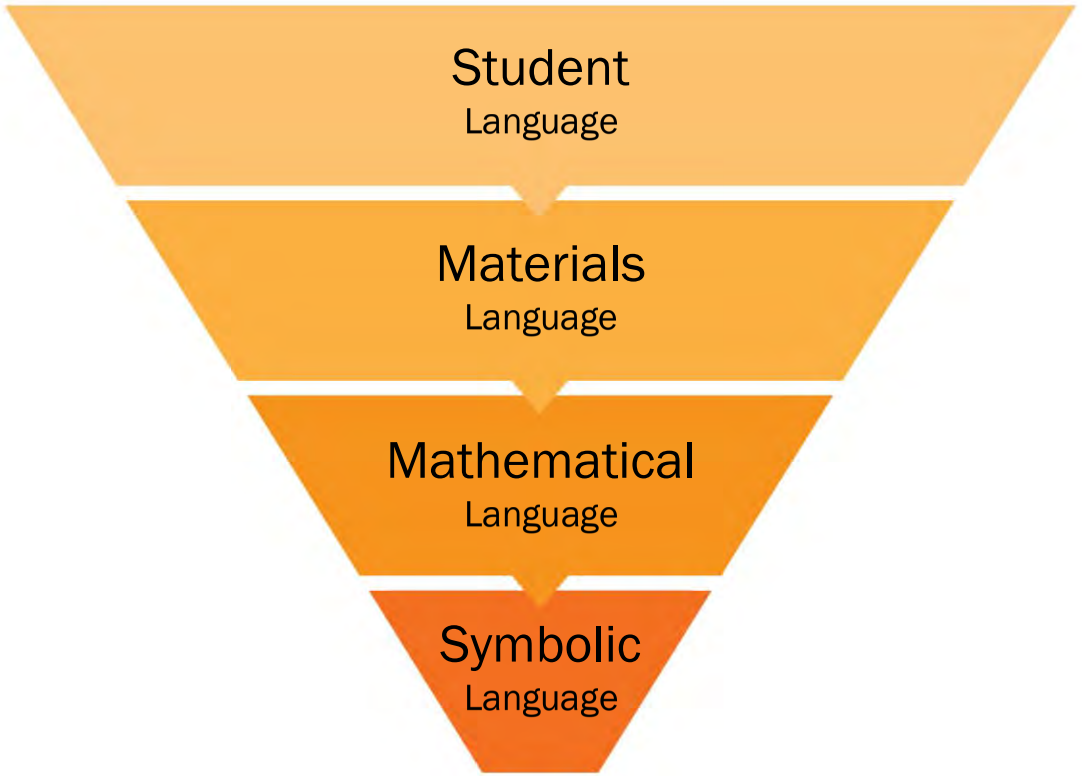
George Polya's four phases of problem solving: https://www.ms.uky.edu/~lee/ma310sp15/polya.pdf

Features of Academic Development

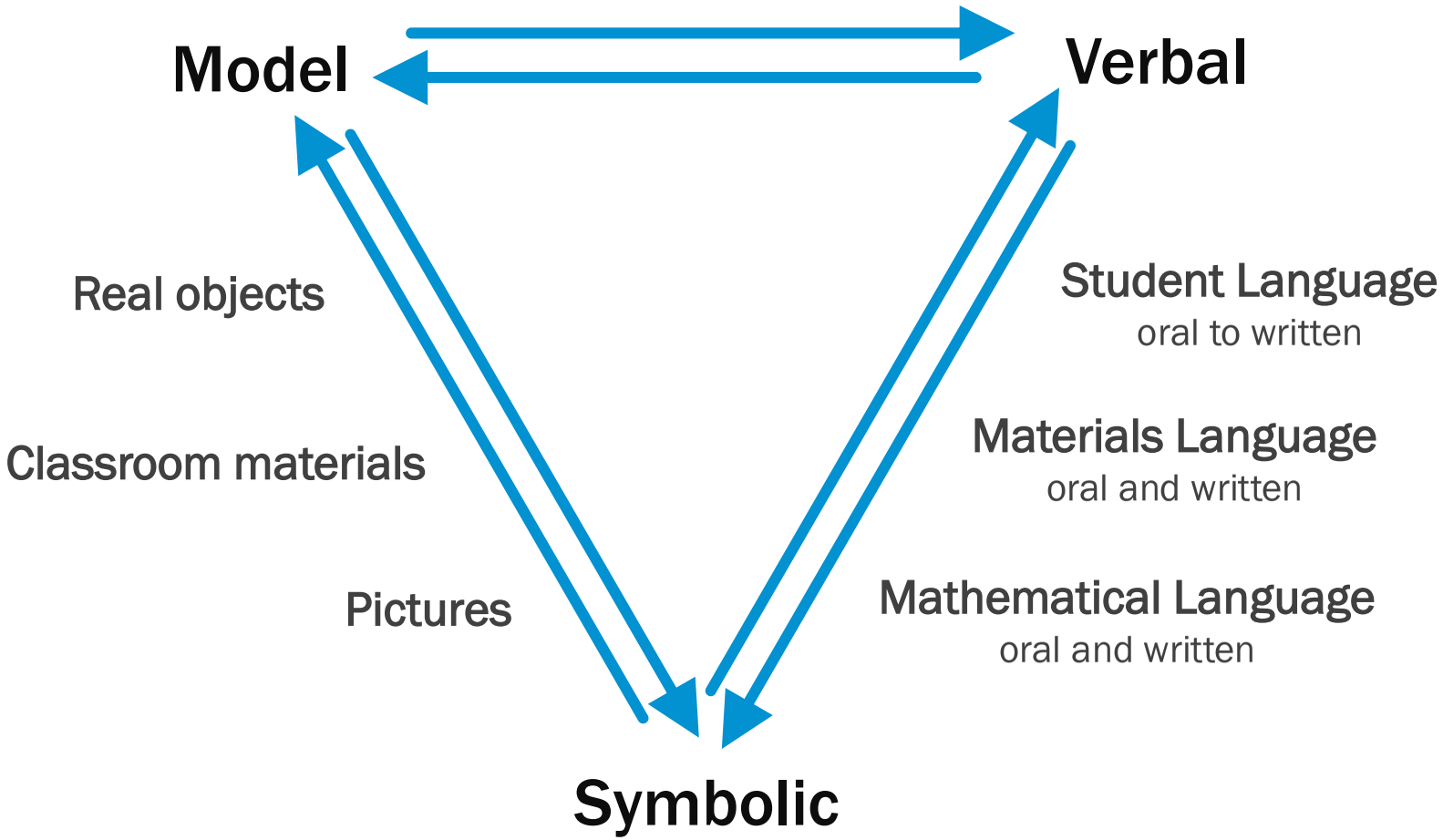
	Performance Criteria	Features
Discourse Level	Linguistic Complexity *Quantity and variety of oral and written text*	Amount of speech/written text Structure of speech/written text Density of speech/written text Organization and cohesion of ideas Variety of sentence types
Sentence Level	Language Forms and Conventions *Types, array, and use of language structures*	Types and variety of grammatical structures Conventions, mechanics, and fluency Match of language forms to purpose/perspective
Word/Phrase Level	Vocabulary Usage *Specificity of word or phrase choice*	General, specific, and technical language Multiple meanings of words and phrases Formulaic and idiomatic expressions Nuances and shades of meaning Collocations



Language Stages



ORIGO's Teaching Model*



*Adapted from Ed Rathmell and Joseph Payne

Sentence Frames

- Discussion support
- Contextualizes and gives meaning to vocabulary
- Gives structure for language skills
- Scaffolds to help students express their mathematical thinking in speaking and writing

Sentence Frames

Language Support

Beginning	A _____ has _____.
Intermediate/ Advanced	A _____ has _____, _____, and _____. My shape has _____, _____, and _____.

Possible Sentence Frames for the Mathematics Classroom

- In order to solve this problem, I need to know _____.
- This is a _____ problem because I see _____.
- I started with an estimate by _____.
- I use the _____ operation because the questions asked me to _____.
- My answer is _____ and I think this is reasonable because ____.
- Another way to solve this would be _____.
- I respectfully agree/disagree with _____ because _____.

Possible Content Specific Sentence Frames

- My number has ____ thousands, ____ hundreds, ___ tens and __ ones.
- This shape is a _____ because it has ____ sides and ___ angles.
- My number is a fraction because it has a _____ and _____.
- The array has ____ rows and ____ columns.
- I shaded ___ parts of the shape.
- I partitioned the _____ into _____.

Works Cited

Barton, Mary Lee, and Clare Heidema. *Teaching Reading in Mathematics: A Supplement to Teaching Reading in the Content Areas Teacher's Manual (2nd Ed.)*. Aurora, Co.: Mid-Continent Research for Education and Learning, 2002. Print.

Bresser, Rusty, Kathy Melanese, and Christine Sphar. *Supporting English Language Learners in Math Class, Grades 3-5*. Sausalito, CA: Math Solutions Publications, 2008. Print.

Bresser, Rusty, Kathy Melanese, and Christine Sphar. *Supporting English Language Learners in Math Class, Grades K-2*. Sausalito, CA: Math Solutions Publications, 2009. Print.

Chapin, Suzanne H., Mary Catherine. O'Connor, and Nancy Canavan Anderson. *Classroom Discussions: Using Math Talk to Help Students Learn, Grades 1-6*. Sausalito, CA: Math Solutions Publications, 2003. Print.

Hill, Jane, and Kathleen Flynn. *Classroom Instruction That Works with English Language Learners*. Alexandria, VA: Association for Supervision and Curriculum Development, 2006. Print.

Immersion. Prod. Media That Matters. *YouTube*. YouTube, 16 June 2009. Web. 30 Oct. 2015. https://www.youtube.com/watch?v=D6HUv2eFdLg

Kazemi, Elham, and Allison Hintz. *Intentional Talk: How to Structure and Lead Productive Mathematical Discussions*. Portland, ME: Stenhouse, 2014. Print.

Kersaint, Gladis, Denisse R. Thompson, and Mariana Petkova. *Teaching Mathematics to English Language Learners*. New York: Routledge, 2013. Print.

Ruiz Soto, Ariel G., Sarah Hooker, and Jeanne Batalova. "States and Districts with the Highest Number and Share of English Language Learners." *Migrationpolicy.org*. Migration Policy Institute, 02 June 2015. Web. 30 Oct. 2015.