


Algebraic Thinking and English Language Learners: Building Background and Success

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Three Views on Teaching Mathematics to ELLs

- **View 1.** Using symbols that are used across cultures, is universal and therefore, easily accessible to language learners.
- **View 2.** The best thing to do for ELL is “Just Good Teaching”, in other words embracing the recommendations outlined in *Principles and Standards* (2000).
- **View 3.** Integrate standards-based practices with intentional language instruction.




Our Session Outline

- Integrating Vocabulary Support
- Creating a Language-Rich Learning Environment
- Using Context and Visuals

Logical connectors can pose problems for all learners, in particular ELLs

Examples:

➤ either, or	➤ that is
➤ if...then	➤ for example
➤ if and only if	➤ such that
➤ because	➤ but
	➤ consequently

	Hairpin	Purse	Coins	Coats	Coins 2	Coins 3	Coins 4
In							
Out							

What will come out of the magic pot?

When Should We Focus on Vocabulary?

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    graph TD
      Root[Vocabulary word to consider] --> Context
      Root --> Concept
      Context --> ContextNew[New]
      Context --> ContextReview[Review]
      Concept --> ConceptNew[New]
      Concept --> ConceptReview[Review]
      ContextNew --> ContextNewRelevant[Relevant]
      ContextNew --> ContextNewIrrelevant[Irrelevant]
      ContextReview --> ContextReviewEngaging[Include in engaging review at beginning of lesson]
      ConceptNew --> ConceptNewCanSolve[Can the problem be solved without knowing the exact meaning?]
      ConceptReview --> ConceptReviewEngaging[Include in engaging review at beginning of lesson]
      ContextNewRelevant --> ContextNewRelevantPreview[Allow time for vocabulary preview]
      ContextNewIrrelevant --> ContextNewIrrelevantChange[Change context]
      ConceptNewCanSolve --> ConceptNewCanSolveWork[We allow students to work the problem and then attach meaning during or after the lesson]
      ConceptNewCanSolve --> ConceptNewCanSolveNoCarefully[No Carefully preview before lesson]
  
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(Adapted from Bay-Williams, & Livers, 2009, pp. 238-246)

Order of Operations

Write two **expressions** to describe the number of coins

Operations higher in the hierarchy are completed first

Parenthesis () include operations to be done first

Order of Operations

Bay-Williams & Martini (in press), Order of Operations: The Myth and the Math. *Teaching Children Mathematics*. (Figure adapted from Ameis, 2011)

Growing Geometric Patterns

Growing Geometric Patterns

- Make Train #5.
- Complete the table.

Train	1	2	3	4	5	10	n
Smiley Faces							
- What is the **rule**? Write in a complete sentence. Expression
- What is the **equation** for finding the number of cubes (c): _____
- Use the **equation** to answer these questions.
 - How many smiley faces for train 15?
 - How many smiley faces for train 100?
 - 50 tiles are used for which train number?
 - 130 tiles are used for which pattern number?

Environmental Print...

Grocer Weekly Deals
 2 lbs. of grapes for \$3

Number of lbs. that you want to buy	Your Price
2	\$3.00
3	
5.5	
N?	

Mathematical Practices Strategies for ELLs

CCSS Recommendation	ELL Recommendation
MP #1: Make Sense and Persevere	<ul style="list-style-type: none"> ➤ Build on prior knowledge ➤ Honor different strategies ➤ Use illustrations
MP #5: Use appropriate tools strategically	<ul style="list-style-type: none"> ➤ Use tools ➤ Incorporate cultural connections ➤ Use real contexts
MP #6 Attend to precision	<ul style="list-style-type: none"> ➤ Use language (speaking, writing) ➤ Emphasize vocabulary