Strategies for Supporting Algebraic Thinking with ELLs

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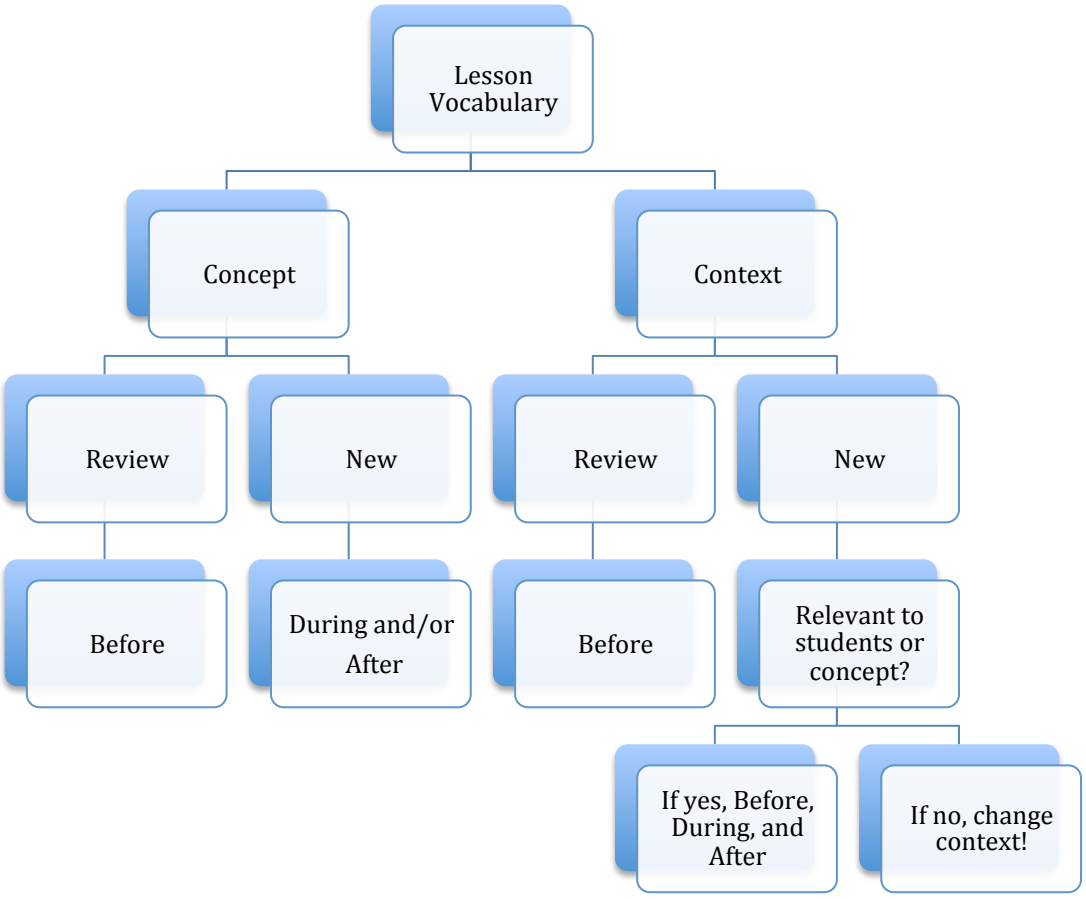
Table 2 These obstructions may occur when preteaching vocabulary.

CAUTION

Obstruction	Description
Shift in lesson purpose	Lesson shifts to a vocabulary lesson versus a mathematics investigation.
Time tradeoff	Time spent preteaching is less time to explore the task. It typically means removing another strategy from the lesson that could help students.
TMI (too much information)	Vocabulary overload (Garrison and Mora 1999) occurs in that a laundry list of all possible related vocabulary is covered instead of the essential mathematics vocabulary. Less is more.
Unknown concept	The vocabulary is explained for concepts not yet learned (Garrison and Mora 1999). Words preceding the concepts cause a loss of rigor and lower the cognitive demand.
Focus on nonessential words	The lesson focus becomes the context of the problem (e.g., things seen at an amusement park) rather than the mathematics.

When should we focus on vocabulary?



Figures from Livers, S. D., & Bay-Williams, J. M. (2014). Constructing (not Obstructing) Meaning. *Mathematics Teaching in the Middle School, 20*(3), 152-159.

Two of Everything

Magic Pot

1. Make a **table** to show what goes **in** the pot and what goes **out** of the pot.

	hairpins	*purses*	*coins*	*coats*	*Coins2*	*Coins3*	*Coins4*	*Coins C*
In	*1*	*1*	*5*					
Out								

2. What happens when…
- 47 Coins go in the pot? _____
- 92 Coins go in the pot? _____
- 1001 Coins go in the pot? _____
- What is the rule (in words) for how many coins come **out** of the pot:

_____

3. What was put in the pot if…
- 42 came out? _____
- 200 came out? _____
- 1,000,000 came out? _____
- 650 came out? _____
- What is the rule for how many go in:

_____

4. Write:
(1) the rule in words or pictures of what happens with the magic pot (so that 5th graders can understand).

(2) an expression to tell the rule in symbols.

How Many of Everything?

□	△
Input	Output
1	8
2	16
3	24
4	
5	
⋮	
10	
□	

□	△
Input	Output
1	5
2	6
3	7
4	8
5	
⋮	
□	

□	△
Input	Output
1	3
2	5
3	7
4	9
5	
⋮	
□	

□	△
Input	Output
1	2
2	5
3	8
4	11
5	
⋮	
□	

□	△
Input	Output
1	1 ½
2	2
3	2 ½
4	3
5	
⋮	
20	
□	

□	△
Input	Output
1	
2	
3	
4	
⋮	

Design a Rule

EXIT SLIP
• Write your names • Fill in Output for gray rows using your secret rule.
TRADE
• Complete the table you received • Write the rule • Write the expression • Write the equation • Sign at the bottom

Design your Own

Names:

Input	Output
1	
2	
3	
4	
10	
100	
Rule (in words)	
n	Expression

Equation: _____

Design a Rule

EXIT SLIP
• Write your names • Fill in Output for gray rows using your secret rule.
TRADE
• Complete the table you received • Write the rule • Write the expression • Write the equation • Sign at the bottom

Design your Own

Names:

Input	Output
1	
2	
3	
4	
10	
100	
Rule (in words)	
n	Expression

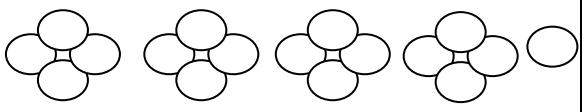
Equation: _____

Each Orange Has 8 Slices Recording Table

Story	Table
Rule	**Equation**

Coin Stacking

Name:_____

Expression	Picture	Total
$5 + 8 \times 6$		
$2 \times 4 - 5 \times 2$		
		
		24
$2 + 3 \times 4 + 5 \times 2 - 5$		