



## Math and Language: Next Steps

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## OVERVIEW

- I. Pseudo- vs. Authentic Communication
- II. Authentic Communication Features
- III. Transition Improv: Pro-Con
- IV. Stronger & Clearer Each Time Activity
- V. Next Steps



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## Focal Students

Do you have any students who want to learn, but they:

- aren't motivated enough by points and grades?
- have learned to "play" school?
- do the bare minimum?
- have adeptly figured out how to talk as little as possible in activities that require talk?
- feel like they don't belong?
- struggle academically because of language?
- lack social skills?



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## Communicating to Learn Language, Content, etc.

"Language is learned, not because we want to talk or read or write about language, but because we want to talk and read and write about the world. Especially for children, language is the medium of our interpersonal relationships, the medium of our mental life, the medium of learning about the world."  
 --Courtney Cazden (1977)

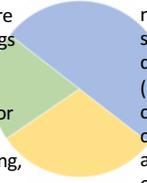


Neil Mercer, Hugh Mehan, Lev Vygotsky, John Dewey, Pierre Bourdieu, Jerome Bruner, Lauren Resnick, Martin Nystrand, Patricia Gándara, Lily Wong Fillmore, Kenji Hakuta, David Pearson, James Gee, Guadalupe Valdés

## I. Pseudo-Communication vs. Authentic Communication

Using words and other meaning-carriers to share information and do things for reasons *other than* using the information in meaningful ways (e.g., for getting points & praise, showing learning, winning, showing off, etc.)





Using words and other meaning-carriers to share information for doing meaningful things (building, creating, changing, deciding, clarifying, negotiating, arguing, etc.) that just one person can't do. (R-W-L-S-C)

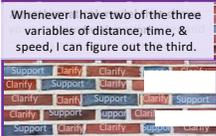
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## II. Authentic Communication Features

For developing content, thinking, language, and social skills

Purposeful building of idea(s)

Whenever I have two of the three variables of distance, time, & speed, I can figure out the third.



Information gap(s)

STUDENT A	STUDENT B
It is an interesting...	It is an interesting...
...	...
...	...
...	...
...	...

If needed, there is attention to language in service of communication (Language modeling & scaffolding, sentence frames, practice, feedback, etc.)

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### Building Ideas Mindset (Agency & Autonomy)

What new ideas will I start building today?

Is this idea as clear and strong as possible?

What ideas am I/we building this week and how do these tasks and texts help?

Have my initial ideas changed?

How can I help others build their ideas as much as possible?

### What are Ideas that students would-could-should build?

Claim	Interpretation
Conclusion	Concept
Conjecture	Theory
Argument	Hypothesis
Solution	Approach
Generalization	Explanation
Plan	Relationship
Procedure	Reasoning

To solve for a variable, and I do the same thing to both sides of an equation. Pi never changes and I can use it

To figure out the area of crazy polygons,  $ab + bc + ac$  works.

If you need more ones to subtract.

If the x has an exponent, its graph is

I think we come up with two

To figure out volume of something you need to multiply

When you need to add up groups of things

By looking at the quadratic, I can decide whether to factor, complete

Multiplying fractions makes them even smaller.

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### III. Transition Improv Activity: Pro-Con

**Topic:** Centering learning (of content & language) on authentic communication (building ideas, info gaps, attention to language) (You will make recommendations to curriculum developers on this topic)

**Transitions:** However,  
On the other hand,  
Then again,

~~but~~

**Frames:** One advantage is ... For example, ...  
Another positive of ... is... because...  
A drawback of \_\_\_ is ...  
In spite of the positives of \_\_\_\_\_,

**Listeners can & should:**

- Prompt for clarification
- Prompt for support
- Offer idea seeds w/ "What about...?"

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### Explaining Ideas Should be a Big Part of the Goal

The goal should not just be to solve problems and "show your work." It should also be to explain the math (reasoning) that the problems are meant to teach. And a key aspect of the explanation is using problems as examples and evidence of the mathematical ideas being explained.

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### What does building an idea look like? (And how do we decide if it's built up enough?)

**Prompt:** Work with your partner to come up with an explanation of how we can use two or more lines on a graph.

IDEA

CLARIFY

SUPPORT

Linear equations with different slopes intersect on a graph, and that can be a decision point.

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IDEA

CLARIFY

SUPPORT

Linear equations with different slopes intersect on a graph, and that can be a decision point.

It's how the two variables relate; it's the m in  $y = mx + b$

What's an example of a line?

What is a slope and how do we find it?

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**What does building an idea look like?**  
 (And how do we decide if it's built up enough?)  
**Prompt:** Work with your partner to come up with an explanation of how we can use two or more lines on a graph.

IDEA  
 CLARIFY  
 SUPPORT

Linear equations with different slopes intersect on a graph, and that can be a decision point.

It's how the two variables relate; it's the m in $y = mx + b$	Or when you go the same speed and distance	What about when there are two lines?
What is a slope and how do we find it?	What's an example of a line?	When you buy more things that are the same price

**What does building an idea look like?**  
 (And how do we decide if it's built up enough?)  
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IDEA  
 CLARIFY  
 SUPPORT

Linear equations with different slopes intersect on a graph, and that can be a decision point.

Because if not, they never meet	Why?	But the slopes need to be different	Two lines intersect and that's the answer
It's how the two variables relate; it's the m in $y = mx + b$	Or when you go the same speed and distance	What about when there are two lines?	
What is a slope and how do we find it?	What's an example of a line?	When you buy more things that are the same price	

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IDEA  
 CLARIFY  
 SUPPORT

Linear equations with different slopes intersect on a graph, and that can be a decision point.

Like this apple problem. They have different slopes	And different b's, 2 and 7. If they had the b, that would be the answer	The place starting at 2 costs more per box
Because if not, they never meet	Why?	But the slopes need to be different
It's how the two variables relate; it's the m in $y = mx + b$	Or when you go the same speed and distance	What about when there are two lines?
What is a slope and how do we find it?	What's an example of a line?	When you buy more things that are the same price

That means the apples cost less til they cross

Two lines intersect and that's the answer

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 (And how do we decide if it's built up enough?)  
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IDEA  
 CLARIFY  
 SUPPORT

Linear equations with different slopes intersect on a graph, and that can be a decision point.

So for > 8 boxes, we switch	But we can't eyeball it; we gotta set them equal to each other, like the trains, to get x	That means the apples cost less til they cross
Like this apple problem. They have different slopes	And different b's, 2 and 7. If they had the b, that would be the answer	The place starting at 2 costs more per box
Because if not, they never meet	Why?	But the slopes need to be different
It's how the two variables relate; it's the m in $y = mx + b$	Or when you go the same speed and distance	What about when there are two lines?
What is a slope and how do we find it?	What's an example of a line?	When you buy more things that are the same price

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IDEA  
 CLARIFY  
 SUPPORT

Linear equations with different slopes intersect on a graph, and that can be a decision point.

So for > 8 boxes, we switch	But we can't eyeball it; we gotta set them equal to each other, like the trains, to get x	That means the apples cost less til they cross
Like this apple problem. They have different	How do we prepare students to have idea-building conversations like this?	The place starting at costs more per box
Because if not, they never meet		ect and that's the
It's how the two variables relate; it's the m in $y = mx + b$	Or when you go the same speed and distance	What about when there are two lines?
What is a slope and how do we find it?	What's an example of a line?	When you buy more things that are the same price



### Designing "Stronger & Clearer Each Time" Activities



1. Prompt for an original response
2. Successive partners: borrow and use the language, ideas, and evidence each time-->
  - **Stronger** (often longer) with better supporting evidence and examples, and
  - **Clearer** with more precise terms and linked, organized, complete sentences.
3. Listeners push for **clarification & support**, and offer ideas
4. Scaffolds are reduced during the activity.

### "Stronger & Clearer Each Time" Grid

I think to draw it. Then cut up into ounces of each thing.

Take one or two-word notes switch partners! Remember, stronger & clearer!

I think we gotta find like how much ounces for a dollar it is. Like one dollar you get, I don't know.

Pre-write:  
Cut into ounces each bottle. Then add or times.  
-----  
Post-write:

Silvia Partner

Darla decides to buy a sports drink. Her choices are a 20-ounce bottle for \$1.49 or a 32-ounce bottle for \$2.49. Which is the better value? Explain what you did to get your answer and why.

### "Stronger & Clearer Each Time" Grid

I think to draw it. Then cut up into ounces of each thing.

Take notes & switch partners! Remember to say "because" to justify your steps

I think we gotta find like how much ounces for a dollar it is. Like one dollar you get. I don't know. I kinda did that, but I did for one ounce, its cost. I did 1.49 over 20. I think it's like 70 cents. And 32 over, no, 2.49 over 32. I didn't finish it.

I wanna find how much a dollar can get, like of ounces. So 1 dollar is like 1 over 1.50, two thirds. So I take 2/3 of it?

Silvia Partner

Darla decides to buy a sports drink. Her choices are a 20-ounce bottle for \$1.49 or a 32-ounce bottle for \$2.49. Which is the better value? Explain what you did to get your answer and why.

### "Stronger & Clearer Each Time" Grid

Pre-write:  
Cut into ounces each bottle. Then add or times it.  
-----  
Post-write:  
You need to find out how much each ounce is. So I did cost over number of ounces. I got 7 for the 20 bottle.

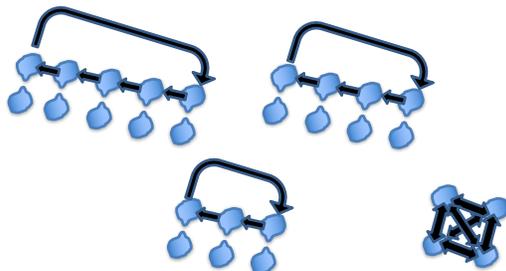
I think we gotta find like how much ounces for a dollar it is. Like one dollar you get. I don't know. I kinda did that, but I did for one ounce, its cost. I did 1.49 over 20. I think it's like 70 cents. And 32 over, no, 2.49 over 32. I didn't finish it.

First I think how much ounces for a dollar. But Alan dijo que hay que buscar cuánto cuesta each ounce. I agree. So I just divide it. So 1.49, divide 20 in it; Alan said 70, but I think it's 7.

Silvia Partner

Darla decides to buy a sports drink. Her choices are a 20-ounce bottle for \$1.49 or a 32-ounce bottle for \$2.49. Which is the better value? Explain what you did to get your answer and why.

### Interaction Mini-Lines



### "Stronger & Clearer Each Time" Grid

Name	It takes Lisa, by herself, 12 hours to plant trees on an acre of land. It takes Ana 8 hours, by herself. How long would it take if they work together? Find two solution methods and be able to explain them both to others to help them solve any problem like this.	You own the land and want to estimate how much to pay them.
Me	(just two or three key words, if any)	
1.		
2.		
3.		
Me		

I first thought I needed to figure out...because...  
I know that in 4 hours, Ana has finished planting...  
I wonder ...

The answer is 4.8  
The algorithm is  
$$\frac{1}{L} + \frac{1}{A} = \frac{1}{x}$$

Listeners can & should:  
- Prompt for clarification  
- Prompt for support  
- Help with "What about...?"

### Was There Authentic Communication?

Did it foster the development of content, thinking, & language?

❑ Purposeful building of idea(s)?

❑ Information gap(s)?

*A clear understanding & explanation for solving rate problems*

Attention to language in service of communication?

(Language modeling & scaffolding, sentence frames, practice, feedback, etc.)

### Comments After "Oral Language Focused" Lessons

1. A Muslim girl, with tears in her eyes, said, "They laugh at me a lot. But today I had a voice. I could say what I thought. And they listened to me."
2. A shy boy, walking out to his next class, said, "Wow, I never used my brain so much."
3. A teacher said, "I tried single pair-shares and she never shared. Then I tried the three pair-shares and the third time she shared a beautiful idea in complete sentences. She even sat up a little straighter, proud of what she said."

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### V. Sample Next Steps

**Model giving feedback as an observer;** Have a student third observer provide feedback to help deepen paired conversations

Have students **engage in conversations** about learned topics, then self-assess. (10K hrs)

**Model conversations & analyze them** for skills (**clarify & support**) for **building ideas**

**Weave building ideas, clarifying, and supporting** into all interaction activities and discussions (whenever students read, write, listen, speak)

**Have 2<sup>nd</sup> and 3<sup>rd</sup> pair-shares** (e.g., Stronger-Clearer) in which students practice, push and are pushed to **support** ideas and **clarify**, to improve ideas

**Improve pair-shares:**  
 A) More prompting for purposeful **building of ideas**; with an emphasis on reasoning  
 B) Listener prompts talker to **clarify** and **support** in order to help build up idea  
 C) Structure time for A and B students

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