Teaching Mathematics to ELLs: Is it Just Good Teaching?

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TODOS: Mathematics for ALL

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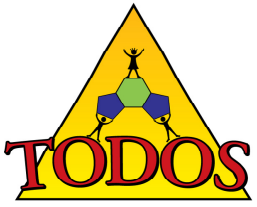
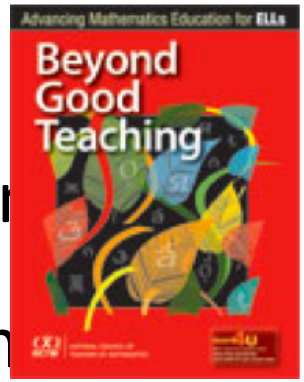


2015 NCTM Annual Meeting

Boston, MA

Guiding Principles for Teaching Mathematics to ELLs

- Challenging Mathematical Tasks
- Linguistically Sensitive Social Environmer
- Learning English while Learning Mathem
- Mathematical Tools and Models as Resources
- Cultural and Linguistic Differences as Intellectual Resources



S. Celedón-Pattichis & N. Ramirez (2012)

Engaging ELLs

MP3: Construct viable arguments…

MP5: Use appropriate tools strategically.

MP6: Attend to precision.

Rehearsing

Beyond Good Teaching

Rehearsing

- Individual
- Small group
- Whole class
- Language level(s)

Thoughts, Stories and *Consejos* fro

Senior ELLs from Rebecca Merkel's class,
Iroquois High School, Jefferson County Public Schools, Louisville,

Reflect on actions or strategies.

What ELLs Observe	How ELLs Respond
Teachers give us identical assignments instead of accommodations for our needs.	*We need accommodations to help us meet YOUR targets.*
Teachers assume that when we don't raise our hands this means we don't need help. They also presume that help means translation.	*We need your help-which can mean giving an example, explaining the question, defining the word, etc.*

S. Celedón-Pattichis & N. Ramirez (2012)

Thoughts, Stories and *Consejos* fro

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Reflect on actions or strategies.

What ELLs Observe	How ELLs Respond
Teachers think they are saving us an embarrassment by not calling on us.	*But not calling on us makes us feel invisible.*
Teachers think they are doing us a favor by always grouping us together.	*We like to work together, BUT WE NEED to work with all of our classmates.*
Teachers avoid conflicts by ignoring students who tease us.	*I can't ignore teasing. Address it.*

S. Celedón-Pattichis & N. Ramirez (2012)

Isabel

Isabel just moved to the United States about six weeks ago. She is familiar with some common conversational language and her replies involve one-word utterances. It is Isabel's third week in her school, and she is the only student in her 4th grade class who speaks Spanish. She sits at her desk looking at what is happening in the classroom. She observes how students interact with the teacher and listens to the teacher and students as they pronounce different words emphasized during the mathematics lesson.

S. Celedón-Pattichis & N. Ramirez (2012)

Isabel (continued)

As the students work to find the area of a rectangle, Isabel is not clear on what to do but, when Mrs. Garza **approaches her**, Mrs. Garza **gestures to** indicate that they are trying to find the area of the rectangle and Isabel immediately writes down the area saying, "área." Mrs. Garza repeats, "Yes, the area is…square units," **acknowledging the student's first language** and **modeling ways to participate** in the mathematics classroom. The teacher finds out that Isabel actually knows the mathematics concepts, but Isabel was not sure what the task itself entailed.

Isabel (continued)

Mrs. Garza continues to work with Isabel on a **one-on-one basis**, taking time to **translate** into Spanish, using **precise mathematical language in English**, and **continually assessing** Isabel's understanding of concepts. The teacher **looks for opportunities** for Isabel to present her mathematical thinking. As the weeks progress, Isabel begins to present her work in class by using diagrams, gestures, and mathematical notations.

S. Celedón-Pattichis & N. Ramirez (2012)

Beyond Good Teaching

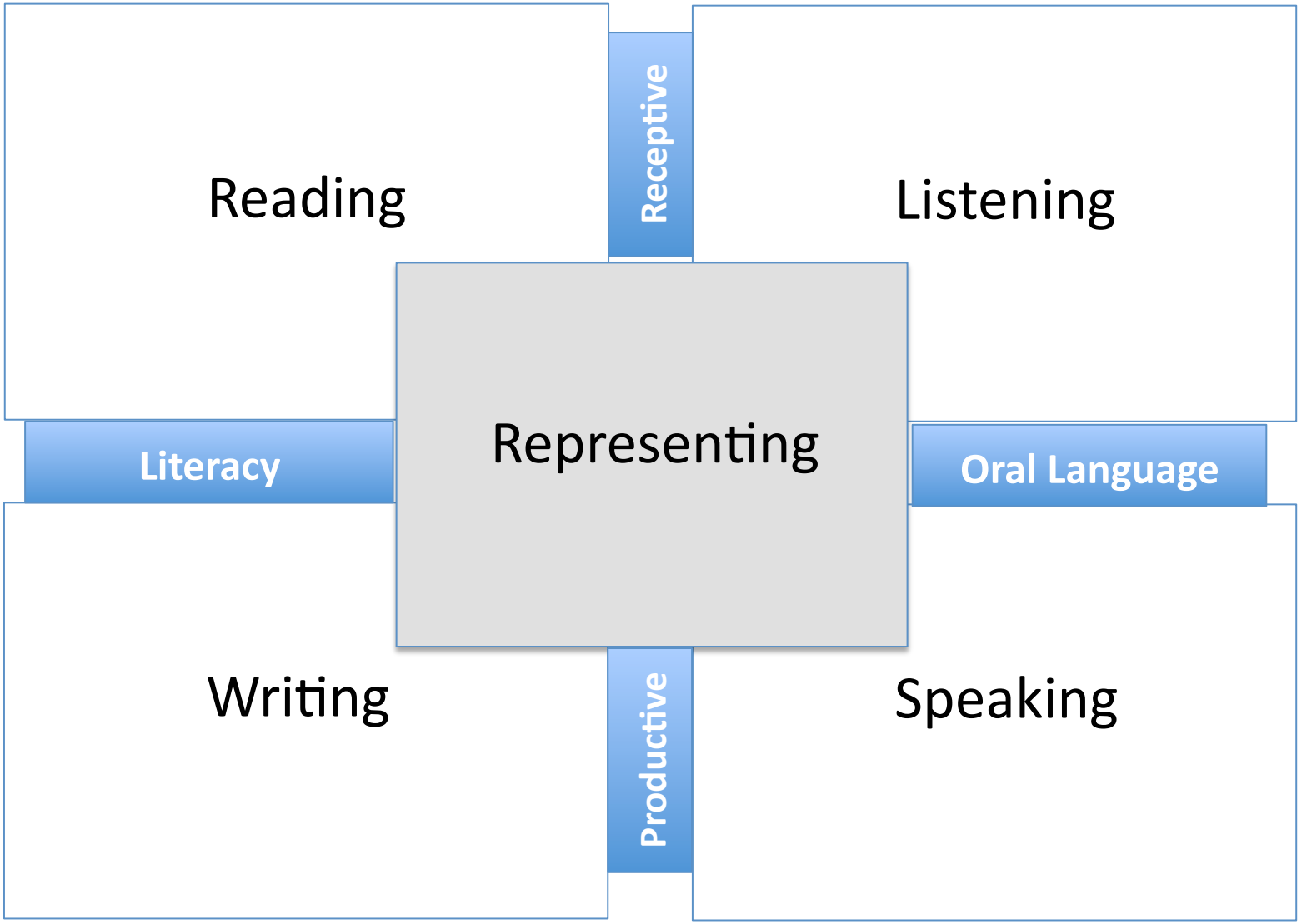
Specific attention to gestures

- Teacher gestures
- Student gestures

Beyond Good Teaching

Teaching English while teaching mathematics

- **Language goals and trajectories**
- **On-going plan to give opportunities for language development**
- **On-going support**
- **Formal or informal**



J. Aguirre and G. Bunch
in Celedón –Pattichies and Ramirez (2012)

Beyond Good Teaching

Teaching language while teaching mathematics

- Frayer model
- Word wall
- Stems/sentence frames
- Anchor charts/mapping
- Journals

Use stems or sentence frames to develop and increase mathematical discourse

- I agree with. . . because . . .
- I disagree with . . . because . . .
- I have a question about . . .
- I know that . . . so I used that to find . . .
- This is the same as . . . because . . .
- This is different from . . . because . . .
- I predict . . . because I am thinking that . . .
- The answer makes sense because . . .

Not just stems but stems on steroids

Terminology Related to Groups

- Mr. Baker planted 8 rows of 5 bean plants. How many bean plants are there altogether? (What is the **total** number of bean plants?)
- Felipe made 6 batches of cookies for the class. **Each** batch makes 4 **dozen** cookies. How many cups of granola did Felipe make?
- How many bunches of 5 are **contained in** a crate of 60 bananas?
- How many piles of 10 are can you make if you have 60 pennies?

Problem Solving

K What do you know about the problem? What's going on?

F What do you need to find? What will be the answer statement? Use the units.

A What do you know about the answer? What is a good estimate of the answer? Use <, > or about.

There were 12 birds on a branch. Some birds flew away. Now there are 7 birds on the branch. How many birds flew away?

Class discussion to understand the situation

Answer statement _____ birds flew away.

Reasoning about answer

I know that the answer is _____ than _____ _____.

more **less**

How do you know that?

Pigs and Hens

A farmer had a bunch of pigs and hens and lost count of how many of each he had. He was trying to count them as they moved around and found that he could count ___ heads and ___ legs. How many of each animal did he have?

Pigs and Hens

A farmer had a bunch of pigs and hens and lost count of how many of each he had. He was trying to count them as they moved around and found that he could count 50 heads and 140 legs. How many of each animal did he have?

Beyond Good Teaching

- Give students opportunities to rehearse their talk
- Make accommodations with language in mind
- Plan for and look for gestures
- Focus on teaching English while teaching mathematics
- Use problem solving as a means of learning language
- Attend to the listening, speaking, reading, writing, and representational demands in planning and analyzing lessons