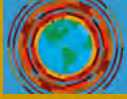


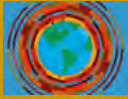
Implementing Mathematical Practices: Strategies that Work for ELL and Struggling Students

TODOS 2014 Beyond Awareness ~ Equity, Access and Achievement for ALL!




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Why do English Learners have difficulty with Academic Language?



- ♦ A myriad of influences—some out of our influence, let's focus on instructionally
- ♦ Supports for learning new material in a new language
 - ♦ Lessons that are meaningful and engaging—ample opportunity to practice using language orally
 - ♦ Grouping students in teams
 - ♦ Teacher expectations
 - ♦ Partners for specific tasks (planned configurations)
 - ♦ Teachers who know their students, their cultures, and their families
- ♦ Access to the language—“English noise”
- ♦ Explicit instruction with a variety of approaches and strategies

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The Role of Discussion and Conversation in Developing Academic Language


- ♦ Today emphasis has shifted from acquiring vocabulary and solving standard word problems to learners explaining solution processes, describing ideas, presenting arguments, and proving conclusions... (Cuevas, 2005, p. 71)



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NCTM's Communication Standards


- ♦ Instructional programs from PreK-12 should enable all students to:
 - ♦ Organize and consolidate their mathematical thinking through communication
 - ♦ Communicate their mathematical thinking coherently and clearly to peers, teachers, and others
 - ♦ Analyze and evaluate the mathematical thinking and strategies of others
 - ♦ Use the language of mathematics to express mathematical ideas precisely



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What is the Academic Language of Mathematics?


- ♦ Metaphor of bricks and mortar
 - ♦ Math content-specific—e.g. algebraic symbol, formula, geometric shape
 - ♦ General academic words—e.g. describe, represent, and approximate



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CCSSM Mathematical Practices


The Common Core proposes a set of Mathematical Practices that all teachers should develop in their students. These practices are similar to NCTM's Mathematical Processes from the *Principles and Standards for School Mathematics*.



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CCSSM 8 Mathematical Practices


1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.



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In preparation for this session, we recognize:


- ♦ The many challenges ELL students face while learning mathematics
- ♦ Many need support learning new mathematics and learning a new language
- ♦ Providing well-designed support for ELL students is not an easy task
- ♦ Sharing and discussing with other professionals often helps all of us to move further and to become stronger in our support of ELL students



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Strategies that Work for ELL and Struggling Students

- ♦ Strategies are effective for ALL students—research-based and relied heavily on the work of EDC, Math Solutions, and SIOP (Sheltered Instruction Observation Protocol)
- ♦ Provide for planning a strong lesson includes asking questions and using manipulatives, along with:
 - 1) Planning Strong Lessons
 - 2) Grouping Strategies
 - 3) Developing Math Concepts
 - 4) Using Student Talk



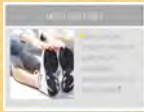
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Warm-Ups

- ♦ Warm-up activities help open-up creative thinking and facilitate students' enthusiasm for mathematics, access prior knowledge, provide scaffolding, and reinforce academic language used in the task

(a) Finding Area in Different Ways, Grades 5-9 MP 2, 3

(b) Puzzling with Polygons, Grades 5-10 MP 1, 5




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Sentence Starters and Frames

- ♦ providing students with the beginning of an academic response, especially in writing, is an effective tool for increasing the quality and quantity of student participation.

(a) Finding Area in Different Ways, Grades 3-8 MP 3, 4

(b) Finding Centers of Rotation, Grades 7-10 MP 1, 2



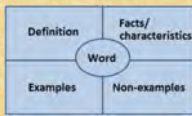
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Word Charts

- ♦ Break down key words and phrases in the task, identifying cognates, related terms, and meanings in Common English versus Academic English

(a) Finding Area in Different Ways, Grades 3-9 MP 1, 7

(b) Puzzling with Polygons, Grades K-8 MP 1, 7



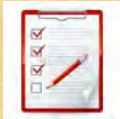
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Teacher Support Notes

- ♦ Help make teachers aware of the nuances and other potential points of confusion in the language used in the task

(a) Finding Area in Different Ways, Grades 5-9 MP 6

(b) Folding to Construct Shapes, Grades 5-9 MP 6




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Spanish Translation

- ♦ A Spanish translation of the task is beneficial when a new beginning student who knows no English is in the class


(a) Finding Area in Different Ways, Grades 5-9 MP 3, 6

(b) Constructing in Three Dimensions, Grades 5-12 MP 2, 3, 4,



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Which grouping strategy is more effective for student learning?

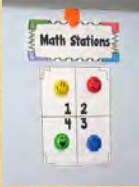


Whole class

Small group work

Partner work


Individual work



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Which is the most effective strategy to develop concepts for you to use with ELL students?


- Teacher asking open-ended questions
- Teacher asking supporting questions or with prompts
- Manipulatives to demonstrate
- Manipulatives to help students explain their thinking
- Using native language as a resource
- Using sentence frames



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A Greater Balance Between Student-talk and Teacher-talk (Zwiers, 2008)


- ♦ Try using these comments
 - ♦ To Prompt More Thinking
 - ♦ You are right on track. Tell us more.
 - ♦ To Fortify or Justify a Response
 - ♦ That's a good probable answer... How did you get to that answer?
 - ♦ To See Other Points of View
 - ♦ That's a great start. Keep thinking and I'll get back to you
 - ♦ To Consider Consequences
 - ♦ Some people think that... What do you think? Why?



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Which is the most effective student Math Talk strategy for an ELL student?

- Student explains his/her thinking/answer
- Students write about their thinking
- Students turn and talk to a partner
- Students repeat what I said, whole class response
- Students repeat to a partner, what I said
- Student repeats what another student said
- Teacher builds in opportunities for student math talk



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Exit Slips


- ♦ Helps students reflect on and process new information, as well as feedback for the teacher
- ♦ 3-2-1 Reflection, Grades K-12 MP 5

3 things I learned today . . .

2 things I will continue to ponder . . .

1 thing I will do as a result of this session . . .

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Concluding Thoughts

- ♦ Give them the tools they need to practice with language skills
 - ♦ Back claims and evidence
 - ♦ More detailed in their observations
 - ♦ Use persuasive language and compelling arguments
 - ♦ Compare points of view
- ♦ Results—academic achievement and school success
- ♦ It's time for a story to take home . . .

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Thank you!

Thank you for your participation and have a terrific TODOS conference!



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References

Bressler, R., Felix, C., Melanese, K., & Sphar, C. (2009). Supporting English language learners in math class: A multimedia professional learning resource. Sausalito, CA: Math Solutions .

Cuevas, G. (2005). Teaching mathematics to English language learners: Perspectives for effective instruction. In Huerta-Macias, A. G., *Working with English language learners: Perspectives and practice* (pp.69-86). Dubuque, IA: Kendall-Hunt.

Echevarria, J. J., Vogt, M., & Short, D. J. (2009). *The SIOP model for teaching mathematics to English language learners*. New York: Pearson.

Education Development Center, Inc. EDC: Learning Transforms Lives Retrieved from <http://mathandlanguage.edu.org/> June 19, 2014.

National Council of Teachers of Mathematics. (2014). *Principles to actions: Ensuring mathematical success for all*. Reston, VA: NCTM.

National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards*. Washington, DC: Authors.

Sherman, H. J., Richardson, L. I., & Yard, G. J. (2009). *Teaching learners who struggle with mathematics: Systematic intervention and remediation* (2nd ed.). New York: Pearson.

Zwiers, J. (2008). *Building academic language: Essential practices for content classrooms*. San Francisco: Jossey-Bass.

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