Integrating the WIDA ELD Standards and the 2011 Math Frameworks

Urban Math Liaisons & ELLDirectors Meeting
November 15th, 2012

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Presentation Essential Questions

★ What makes the 2011 Math Frameworks challenging for ELLs?

★ How can teachers use the WIDA ELD standards to plan Common Core aligned math instruction for ELLs?

★ What supports would teachers need in order to provide ELLs access the new math standards?
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★ Write a few ideas on your own.

★ Next, find a partner with a different role (Math Liaisons or ELL Director). Turn and Talk about the question.

★ After the Turn and Talk we will share as a whole group.
What makes the 2011 Math Frameworks Challenging for ELLs?

★ New mathematical practices focus on conceptual understanding
  ★ Focus on accuracy of reasoning over accuracy of language
  ★ Build precision of language and literacy
★ Demonstrating deeper conceptual understanding requires sophisticated use of language
  ★ Language of math is complex: multiple representations, texts, discourse styles
  ★ Academic language includes vocabulary + discourse practices (explaining, justifying)
★ ELLs are a diverse population
Vignette: Language Precision

Context:

★ Prior instruction on shapes and related vocabulary ("radius," "diameter," "congruent," "hypotenuse", and the names of different quadrilaterals)

★ Current lesson: Students use English in the context of folding and cutting to make Tangram pieces

Vignette: Language Precision

**Teacher:** Who can describe a rectangle? Eric, can you describe it [a rectangle]? Can you tell me about it?

**Eric:** A rectangle has . . . two . . . short sides, and two . . . long sides.

**Teacher:** Two short sides and two long sides. Can somebody tell me something else about this rectangle, if somebody didn’t know what it looked like, what, what . . . how would you say it.

**Julian:** Paralela [holding up a rectangle, voice trails off].

**Teacher:** It’s parallel. Very interesting word. Parallel. Wow! Pretty interesting word, isn’t it? Parallel. Can you describe what that is?

**Julian:** Never get together. They never get together [runs his finger over the top side of the rectangle].

**Teacher:** What never gets together?

**Julian:** The parallela . . . they . . . when they go, they go higher [runs two fingers parallel to each other first along the top and base of the rectangle and then continues along those lines], they never get together.

How can teachers use the WIDA ELD standards to plan Common Core aligned math instruction for ELLs?
How can teachers use the WIDA ELD Standards to plan Common Core Aligned Math Lessons?

1. **Understand the language demands/functions embedded in the 2011 MA Frameworks**
   a) Identify the standard and related Math Practice
   b) Identify the most important related language demands/functions

2. **Use WIDA tools to scaffold learning**
   - CAN DO Descriptors
   - Model Performance Indicators (MPIs)
   - Academic Language Features Performance Definitions
   - 2012 Amplified Standards Template
## Mirror WIDA Lesson Planning Process

<table>
<thead>
<tr>
<th>Steps</th>
<th>Tools</th>
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</thead>
<tbody>
<tr>
<td>1. Select standards-based content or topic <em>(content objective)</em></td>
<td>Curriculum MA Frameworks</td>
</tr>
<tr>
<td>2. Identify language-based expectations for students at each level of proficiency <em>(language objectives, language functions)</em></td>
<td>CAN DO Descriptors Model Performance Indicators (MPIs) Rubrics</td>
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<tr>
<td>3. Identify appropriate scaffolds and supports</td>
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</table>
1. Understand the language demands/functions embedded in the 2011 MA Frameworks

   a) Identify the content standard you want to teach and related Mathematical Practice(s)

   ★ **Standard:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in two ways. *(MA Framework, 8.EE.5)*
1. Understand the language demands/functions embedded in the 2011 MA Frameworks

**Standard:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in two ways. *(MA Framework, 8.EE.5)*

**Math Practice #3:** Construct viable arguments and critique the reasoning of others.
1. Understand the language demands/functions embedded in the 2011 MA Frameworks

b) Identify the most important language demands associated with the content and practice standards

★ Think about the language (words, sentences, discourse) students need to communicate the ideas, concepts and higher order thinking associated with the standard and Math Practice.
Math Practice #3 Language Functions

Comprehend oral and written concepts, procedures, or strategies used in arguments and reasoning, including:

- **Explanations** offered using words or other representations by others
- **Explanations** offered by written texts using words or other representations

Communicate using words about concepts, procedures, claims... and other information related to constructing arguments and critique reasoning:

- **Provide written or verbal explanation** of an argument using words and also using multiple non-verbal representations, concrete referents, or more formal means
- **Justify conclusions and respond** to counterarguments
b) Identify the most important language demands/functions associated with the content and practice standards

**Standard:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in two ways. *(MA Framework, 8.EE.5)*

**Math Practice #3:** Construct viable arguments and critique the reasoning of others.

**Demands/ functions:**

- **Compare and contrast:** in contrast, similarly
- **Interpret or explain:**
  - A slope of ___ means that ___
  - A rate of ___ means that ___
- **Math vocabulary:** graph, slope, proportional
- **Justify:** I think _ because _
- **Critique:** I disagree with _ because _
1. Understand the language demands embedded in the 2011 MA Curriculum Frameworks for Math

b) Identify the most important language demands associated with the content and practice standards

★ Think about the specific tasks (types of activities, assessments) that you want students to engage with to access the standard
b) Identify the **most important language demands** associated with the content and practice standards

**Standard:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in two ways. *(MA Framework, 8.EE.5)*

**Math Practice #3:** Construct viable arguments and critique the reasoning of others.

**Example tasks:**
- Write an equation/make a graph to represent a relationship. Justify answer.
- Identify the slope of a graph and interpret it for a given situation.
- Match equation & graph and justify choices.
- Compare sets of graphs, equations, slopes.
b) Identify the **most important language demands** associated with the content and practice standards

**Demands/ functions:**
- **Compare and contrast:** in *contrast, similarly*
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  A slope of ___ means that ___
  
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Standard + Practice + Task

**Standard:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in two ways. *(MA Framework, 8.EE.5)*

**Math Practice #3:** Construct viable arguments and critique the reasoning of others.

**Sample Task:**
Car A’s speed is shown in the graph, Car B’s speed is given as an equation. Which car is moving faster? Justify your answer.
Activity: Car A’s speed is shown in the graph, Car B’s speed is given as an equation. Which car is moving faster? Justify your answer.

**CAR A**

- **Graph:**
  - Distance (miles) vs. Time (hours)
  - Points on the graph suggest a linear relationship

**CAR B**

- **Equation:**
  - \( y = 40x \)
  - \( y \) = distance travelled in miles
  - \( x \) = time in hours

**Justification:**

From the graph, Car A’s speed can be determined by the slope of the line, which represents the rate of change of distance with respect to time. The speed is constant and can be calculated as the rise over run for any segment of the line. By comparing the slopes of both graphs, we can determine which car is moving faster. Car B’s equation, \( y = 40x \), clearly indicates a speed of 40 miles per hour, confirming that Car B is moving faster than Car A, assuming the graphs represent the actual speeds accurately.
2. Use WIDA tools to scaffold and support learning

- **CAN DO Descriptors** describe language you can expect from students at each proficiency level.

- **Performance Definitions** describe in detail academic language expectations for students at each proficiency level.

- **2012 WIDA Amplified Standards Template**: strand of MPIs related to a particular “context for language use” - an activity or assessment related to a content standard.
2. Use WIDA tools to scaffold and support learning

★ **Model Performance Indicators (MPIs)** provide examples of how students could process or produce language in a specific context (activity, assessment)

★ **Language Function**

★ **Content Stem**

★ **Scaffolds/ Supports**

**Compare choices based on rate calculations in real-life situations using graphic organizers with a partner**

Source: WIDA Standards Framework, Grades 6-12. © www.wida.us
<table>
<thead>
<tr>
<th><strong>Template for Drafting MPIs (p. 16)</strong></th>
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<td><strong>ELD Standard</strong></td>
<td>from WIDA’s 5 Standards</td>
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<tr>
<td><strong>Example Topic</strong></td>
<td>from the state <em>Curriculum Frameworks</em></td>
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<td><strong>Connection</strong></td>
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<td>Lesson Activity or Assessment</td>
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<td><strong>MPI Strand</strong></td>
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<td><strong>Topic-related language</strong></td>
<td>Grade-level words and expressions for all students</td>
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Let’s Put It All Together!

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   a) Identify the content and practice standards
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2. Use WIDA tools to scaffold learning
   ★ CAN DO Descriptors
   ★ Model Performance Indicators (MPIs)
   ★ Academic Language Features Performance Definitions
   ★ 2012 Amplified Standards Template

Massachusetts Department of Elementary and Secondary Education
Let’s Put It All Together!

★ **Standard:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in two ways. *(MA Framework, 8.EE.5)*

★ **Math Practice #3:** Construct viable arguments and critique the reasoning of others.

★ **Task:** Compare a graph and an equation, figure out which car is going faster, and justify the answer.
# Customizing the Template (Veader & Sena, 2012)

**ELD Standard 3:** The Language of Mathematics  
**Topic:** Equations

**Connection:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in two ways. *(MA Framework, 8.EE.5)*

**Example Context for Language Use:** Compare a distance-time graph to a distance-time equation to determine which of two race cars has a greater speed, and explain your answer.

**Cognitive Function:** Students at all levels of English language proficiency UNDERSTAND how to compare the rate in an equation to the slope in a graph and APPLY this knowledge when determining the speed of two cars.

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**Topic-Related Language:** Students at all levels of English language proficiency interact with grade-level words and expressions such as: linear, equation, solve, variable, solution, rate, slope and speed.
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