Navigate your Mathematics + Integrated ELD Journey

Christine Roberts

Access the resources on:
http://ccss.tcoe.org/math/presentations

christine.roberts@tcoe.org
@tcoechristine
Session Outcomes

Participants will:

- Deepen their understanding of the CA Integrated ELD and Designated ELD Standards.
- Learn strategies that support sense making and develop language for English learners while they engage in mathematics.
- Design an Integrated ELD and Math lesson.
Thinking about Fall . . .

- What do you look forward to most during the fall season?
- On a post-it note, jot down a few words.
Fall Reflections & Introductions

- Stand up, Hand up, Pair up to find your 1st partner.
- Introduce yourself (Name, Grade Level, Role Site, & fall response)
- Thank your partner.

- Stand up, Hand up, Pair up to find your 2nd partner.
- Introduce yourself (Name, Grade Level, Role Site, & fall response)
- Add details, clarify language, and build upon your fall response.
- Thank your partner and head back to your seat.
Stronger and Clearer Each Time

Read the prompt.
Write a few words that come to mind to answer prompt.
Meet with 3 others and share your ideas.

Each time you meet:
Practice stating your explanation.
What ideas, words did you hear from others that connect to your idea? How might you use these ideas to make your explanation stronger with the next person you meet with?
Go back to your original response.
Revise it to make your statement stronger and clearer.
Reflect on Stronger and Clearer

What did you change in your original explanation and why?

- How do we support students in becoming better communicators?
- How do we provide opportunities for students to communicate their thinking?
“Every teacher must incorporate into his or her curriculum instructional support for oral and written language as it relates to the mathematics standards and content. It is not possible to separate the content of mathematics from the language in which it is discussed and taught.”

— Francis et al. 2006a, 38
processing and comprehending content

INTEGRATED ELD

DESIGNATED ELD

learning about & practicing a formal English register, vocabulary, language structures, grammar for application

BOTH/AND
Extended Academic Discourse

Expressive

Receptive

Expressive

Receptive

Expressive

Receptive

Content-rich, contextualized exchanges
Learning Mathematics & Language in Every Classroom, Every Day

<table>
<thead>
<tr>
<th>expressive</th>
<th>receptive</th>
</tr>
</thead>
<tbody>
<tr>
<td>speaking</td>
<td>listening</td>
</tr>
<tr>
<td>writing</td>
<td>reading</td>
</tr>
</tbody>
</table>
EXPRESSIVE + RECEPTIVE = Understanding
## Exploratory Talk vs. Presenter Talk

<table>
<thead>
<tr>
<th>Exploratory Talk is...</th>
<th>Presenter Talk is...</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Half formed ideas</td>
<td>● Polished</td>
</tr>
<tr>
<td>● Teacher intervenes to support, not give ideas</td>
<td>● Dense</td>
</tr>
<tr>
<td></td>
<td>● May use standard terms and representations</td>
</tr>
</tbody>
</table>

Honor student thinking/talk in their own words.

How do things make sense to you?

How do we want students to sound/think mathematical in class?
## ELD Standards - Understanding Part I

### Part I: Interacting in Meaningful Ways

#### A. Collaborative
1. Exchanging information and ideas with others through oral collaborative discussions on a range of social and academic topics
2. Interacting with others in written English in various communicative forms (print, communicative technology and multimedia)
3. Offering and justifying opinions, negotiating with and persuading others in communicative exchanges
4. Adapting language choices to various contexts (based on task, purpose, audience, and text type)

#### B. Interpretive
5. Listening actively to spoken English in a range of social and academic contexts
6. Reading closely literary and informational texts and viewing multimedia to determine how meaning is conveyed explicitly and implicitly through language
7. Evaluating how well writers and speakers use language to support ideas and arguments with details or evidence depending on modality, text type, purpose, audience, topic, and content area
8. Analyzing how writers and speakers use vocabulary and other language resources for specific purposes (to explain, persuade, entertain, etc.) depending on modality, text type, purpose, audience, topic, and content area

#### C. Productive
9. Expressing information and ideas in formal oral presentations on academic topics
10. Writing literary and informational text to present, describe, and explain ideas and information, using appropriate technology
11. Justifying own arguments and evaluating others’ arguments in writing
12. Selecting and applying varied and precise vocabulary and other language resources to effectively convey ideas.
Supporting Sense-Making and Language Development

5 Practices
For Orchestrating Productive Mathematical Discussions

Anticipate
Monitor
Select
Sequence
Connect

Talk Moves
Revoicing
Repeating
Reasoning
Adding On
Wait time
Turn-and-Talk
Revise

Stronger & Clearer

Collect & Display

Critique, Correct, & Clarify

Notice & Wonder

Read and Flip/3 Reads/Numberless Word Problems

Notice & Wonder

Talk Moves

Stronger & Clearer

Collect & Display

Critique, Correct, & Clarify

Notice & Wonder

Talk Moves

Stronger & Clearer

Collect & Display

Critique, Correct, & Clarify

Notice & Wonder
What do you notice? What do you wonder?

Burger patties per pack

I notice..... I wonder.....
On Saturday I will be hosting a birthday party for my mom. Many people have been invited. Everyone will need a party hat, a cupcake, a drink, and a balloon.
On Saturday I will be hosting a birthday party for my mom. Thirty people have been invited. Everyone will need a party hat, a cupcake, a drink, and a balloon.
On Saturday I will be hosting a birthday party for my mom. Thirty people have been invited. Everyone will need a party hat, a cupcake, a drink, and a balloon.

- Party hats come in packages of 10 for $5
On Saturday I will be hosting a birthday party for my mom. Thirty people have been invited. Everyone will need a party hat, a cupcake, a drink, and a balloon.

- Party hats come in packages of 10 for $5
- Cupcakes are $6 for a half a dozen.
On Saturday I will be hosting a birthday party for my mom. Thirty people have been invited. Everyone will need a party hat, a cupcake, a drink, and a balloon.

- Party hats come in packages of 10 for $5
- Cupcakes are $6 for a half a dozen.
- Drinks are 2 for $1
- Balloons come in a package of 15 for $2

What questions can we ask about this story?
On Saturday I will be hosting a birthday party for my mom. Thirty people have been invited. Everyone will need a party hat, a cupcake, a drink, and a balloon.

- Party hats come in packages of 10 for $5
- Cupcakes are $6 for a half a dozen.
- Drinks are 2 for $1
- Balloons come in a package of 15 for $2

How much will it cost to purchase all of the supplies for the party?
## Talk Moves to support Academic Discourse

<table>
<thead>
<tr>
<th>Mathematic-specific</th>
<th>Generalized</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Revoicing</td>
<td>● Elaborate &amp; Clarify</td>
</tr>
<tr>
<td>● Repeating</td>
<td>● Supporting Ideas with Examples</td>
</tr>
<tr>
<td>● Reasoning</td>
<td>● Build On or Challenge a Partner’s Ideas</td>
</tr>
<tr>
<td>● Adding On</td>
<td>● Paraphrase</td>
</tr>
<tr>
<td>● Wait Time</td>
<td>● Synthesize Conversation Points</td>
</tr>
<tr>
<td>● Turn-and-Talk</td>
<td></td>
</tr>
<tr>
<td>● Revise</td>
<td></td>
</tr>
</tbody>
</table>

(Chapin, O’Connor, & Anderson, et.al., Kazemi & Hintz)

(Zwiers & Crawford)
Select, Sequence, & Share

Let’s discuss our thinking.
Collect & Display - Language Scoop

A strategy for listening to students and building upon their language.

- Observe students working together and/or talking about a task.
- Record student conversations (include student names).
- At the end of the lesson, the teacher will have a conversation about the language you hear students using.
Critique, Correct, and Clarify

At your table consider the following statements:

What is strong in the language we used?
What can be improved upon?

How can this strategy be used over time to make mathematical thinking clearer?
Supporting Mathematical Communication

What ideas have you learned for supporting students as they communicate about mathematics?
Supporting Sense-Making and Language Development

5 Practices
For Orchestrating Productive Mathematical Discussions

- Anticipate
- Monitor
- Select
- Sequence
- Connect

Talk Moves
- Revoicing
- Repeating
- Reasoning
- Adding On
- Wait time
- Turn-and-Talk
- Revise

Stronger & Clearer

Collect & Display

Critique, Correct, & Clarify

Notice & Wonder

Read and Flip/3 Reads/Numberless Word Problems
Teachers learn to amplify and enrich—rather than simplify—the language of the classroom, giving students more opportunities to learn the concepts involved.

Aida Walqui
Thinking About Language Connected to Mathematics

● How will students interact meaningfully with the mathematics?
● How will students make sense of the language of mathematics (text, diagrams, symbols) and the English language?
● How will students communicate their understanding?
Collaboratively Plan an Integrated ELD Lesson

Use your grade level ELD Standards & Illustrative Task:

- 3rd - Locating Fractions Less than One on the Number Line
- 4th - Sugar in six cans of soda
- 5th - Making S'Mores

Or, design a lesson around a particular concept that you are interested in working on.
What do you want students to do?
(What’s the mathematics learning goal?)

For what purpose will students use language?

Which ELD standard(s) are you going to teach?

How are students using language expressively and receptively throughout the lesson?
1. What do you want students to do? (What’s the mathematics learning goal?)
## Integrated ELD & Math Lesson

<table>
<thead>
<tr>
<th>Mathematics Content</th>
<th>Mathematical Practices</th>
<th>ELD Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Language & Learning Objective:

<table>
<thead>
<tr>
<th>Launch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Explore</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summarize</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>
2. For what purpose will students use language?

Which ELD standard(s) are you going to teach?

(Which standards support the mathematics being taught? Which standards reflect the language functions of the lesson?)
Language Functions

As part of meaning-making, this is the WHY of using language.

- What do students do with language as they engage with content and interact with others?
- How do students represent the active use of language for a particular everyday purpose?
Language Functions

- Describe
- Compare & Contrast
- Cause & Effect
- Sequence
- Problem-Solution
- Express Opinions or Persuade (Thinking)
- Explain
- Classify & Categorize
Writing A Language Objective

Language objectives “articulate for learners the academic language functions and skills that they need to master to fully participate in the lesson and meet the grade-level content standards” (Echevarria, Vogt, and Short 2008).
ELD Standards - Understanding Part I

Section 1: Goal, Critical Principles, and Overview

Goals: English learners read, analyze, interpret, and create a variety of literary and informational text types. They develop an understanding of how language is a complex, dynamic, and social resource for making meaning, as well as how content is organized in different text types and across disciplines using text structure, language features, and vocabulary depending on purpose and audience. They are aware that different languages and variations of English exist, and they recognize their home languages and cultures as resources to value in their own right and also to draw upon in order to build proficiency in English. English learners contribute actively to class and group discussions, asking questions, responding appropriately, and providing useful feedback. They demonstrate knowledge of content through oral presentations, writing, collaborative conversations, and multimedia. They develop proficiency in shifting language use based on task, purpose, audience, and text type.

Critical Principles for Developing Language and Cognition in Academic Contexts: While advancing along the continuum of English language development levels, English learners at all levels engage in intellectually challenging literacy, disciplinary, and disciplinary literacy tasks. They use language in meaningful and relevant ways, appropriate to grade level, content area, topic, purpose, audience, and text type in English language arts, mathematics, science, social studies, and the arts. Specifically, they use language to gain and exchange information and ideas in three communicative modes (collaborative, interpretive, and productive), and they apply knowledge of language to academic tasks via three cross-modal language processes (structuring cohesive texts, expanding and enriching ideas, and connecting and condensing ideas) using various linguistic resources.

<table>
<thead>
<tr>
<th>Part I: Interacting in Meaningful Ways</th>
<th>Corresponding Common Core State Standards for English Language Arts*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Collaborative</td>
<td>• SL.6.1, 8.3, 6; L.6.1, 8.3, 6</td>
</tr>
<tr>
<td>1. Exchanging information and ideas</td>
<td>• W.6.6; WHST.6.6, SL.6.2; L.6.3, 6</td>
</tr>
<tr>
<td>with others through oral collaborative discussions on a range of social and academic topics</td>
<td>• W.6.1; WHST.6.1, SL.6.1, 4, 6; L.6.3, 6</td>
</tr>
<tr>
<td>2. Interacting with others in written English in various communicative forms (print, communicative technology, and multimedia)</td>
<td>• W.6.4.5; WHST.6.4.5, SL.6.6, L.6.1, 3, 6</td>
</tr>
<tr>
<td>3. Offering and justifying opinions, negotiating with and persuading others in communicative exchanges</td>
<td>• SL.6.1, 3, 6</td>
</tr>
<tr>
<td>4. Adapting language choices to various contexts (based on task, purpose, audience, and text type)</td>
<td>• RL.6.1, 7, 9-10, RH.6.1-10; RST.6.1-10, SL.6.1, 3, 3, 6</td>
</tr>
<tr>
<td>B. Interpretive</td>
<td>• RL.6.4-5; RH.6.4-5, RH.6.4-6, RST.6.4-6, SL.6.3-5, 6</td>
</tr>
<tr>
<td>5. Listening actively to spoken English in a range of social and academic context</td>
<td>• RL.6.4-5, RH.6.4-5, RH.6.4-6, RST.6.4-6; SL.6.3; L.6.3, 5-6</td>
</tr>
<tr>
<td>6. Reading closely literary and informational texts and viewing multimedia to determine how meaning is conveyed explicitly and implicitly through language</td>
<td>• L.6.3, 3, 5-6</td>
</tr>
<tr>
<td>7. Evaluating how well writers and speakers use language to support ideas and arguments with details or evidence depending on modality, text type, purpose, audience, topic, and content area</td>
<td>• L.6.3, 3, 5-6</td>
</tr>
<tr>
<td>8. Analyzing how writers and speakers use vocabulary and other language resources for specific purposes (to explain, persuade, entertain, etc.) depending on modality, text type, purpose, audience, topic, and content area</td>
<td>• L.6.3, 3, 5-6</td>
</tr>
<tr>
<td>C. Productive</td>
<td>• SL.6.1-2; WHST.6.1-2, 6; L.6.6.1-6</td>
</tr>
<tr>
<td>9. Expressing information and ideas in formal oral presentations on academic topics</td>
<td>• W.6.1-2; WHST.6.1-2, 6; L.6.6.1-6</td>
</tr>
<tr>
<td>10. Writing literary and informational texts to present, describe, and explain ideas and information, using appropriate technology</td>
<td>• W.6.1-2; WHST.6.1-2, 6; L.6.6.1-6</td>
</tr>
<tr>
<td>11. Justifying own arguments and evaluating others’ arguments in writing</td>
<td>• W.6.1-2; WHST.6.1-2, 6; L.6.6.1-6</td>
</tr>
<tr>
<td>12. Selecting and applying varied and precise vocabulary and language structures to effectively convey ideas</td>
<td>• W.6.1-2; WHST.6.1-2, 6; L.6.6.1-6</td>
</tr>
</tbody>
</table>
Don’t Forget Part II...

Students need equal attention to **learning about how the language of English works.**

They use language as a meaning-making resource and make decisions about how pieces of language work together.

* Browse Part II of the ELD Standards:

  A. **Structuring Cohesive Texts**, standards 1-2
  B. **Expanding & Enriching Ideas**, standards 3-5
  C. **Connecting & Condensing Ideas**, standards 6-7

How might any of these connect to learning in **your** classroom?
# ELD Standards - Understanding Part II

## California Department of Education

## English Language Development Standards for Grade 6

### Part II: Learning About How English Works

<table>
<thead>
<tr>
<th>Activity</th>
<th>Corresponding Common Core State Standards for English Language Arts*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Structuring Cohesive Texts</td>
<td></td>
</tr>
<tr>
<td>1. Understanding text structure</td>
<td>• RL.6.5; RI.6.5; RH.6.5; RST.6.5; W.6.1-5,10; WHST.6.1-2,4-5,10; SL.6.4</td>
</tr>
<tr>
<td>2. Understanding cohesion</td>
<td>• RL.6.5; RH.6.5; RST.6.5; W.6.1-5,10; WHST.6.1-2,4-5,10; L.6.1,3-6</td>
</tr>
<tr>
<td>B. Expanding and Enriching Ideas</td>
<td></td>
</tr>
<tr>
<td>3. Using verbs and verb phrases</td>
<td>• W.6.5; WHST.6.5; SL.6.6; L.6.1,3-6</td>
</tr>
<tr>
<td>4. Using nouns and noun phrases</td>
<td>• W.6.5; WHST.6.5; SL.6.6; L.6.1,3-6</td>
</tr>
<tr>
<td>5. Modifying to add details</td>
<td>• W.6.4-5; WHST.6.4-5; SL.6.6; L.6.1,3-6</td>
</tr>
<tr>
<td>C. Connecting &amp; Condensing Ideas</td>
<td></td>
</tr>
<tr>
<td>6. Connecting ideas</td>
<td>• W.6.1-5; WHST.6.1-2,4-5; SL.6.4,6; L.6.1,3-6</td>
</tr>
<tr>
<td>7. Condensing ideas</td>
<td>• W.6.1-5; WHST.6.1-2,4-5; SL.6.4,6; L.6.1,3-6</td>
</tr>
</tbody>
</table>

### Part III: Using Foundational Literacy Skills

<table>
<thead>
<tr>
<th>Skill</th>
<th>Common Core State Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF.K-1.1-4; RF.2-5.3-4 (as appropriate)</td>
<td></td>
</tr>
</tbody>
</table>

* The California English Language Development Standards correspond to California’s Common Core State Standards for English Language Arts (ELA) and, for grades 6–12, Literacy in History/Social Studies, Science, and Technical Subjects. English learners should have full access to and opportunities to learn ELA, mathematics, science, history/social studies, and other content at the same time they are progressing toward full proficiency in English.
Writing A Language Objective

Language objectives “articulate for learners the academic language functions and skills that they need to master to fully participate in the lesson and meet the grade-level content standards” (Echevarria, Vogt, and Short 2008).

Language Objective = Language functions & skills + Mathematics Content & Practice Standards

CA Mathematics Framework
<table>
<thead>
<tr>
<th>Mathematics Content</th>
<th>Mathematical Practices</th>
<th>ELD Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Language & Learning Objective:**

**Launch**

**Explore**

**Summarize**

- **Identify your ELD Standard(s).**
- **Write your language objective.**
3. How are students using language expressively and receptively throughout the lesson?
Learning Mathematics & Language in Every Classroom, Every Day

<table>
<thead>
<tr>
<th>expressive</th>
<th>receptive</th>
</tr>
</thead>
<tbody>
<tr>
<td>speaking</td>
<td>listening</td>
</tr>
<tr>
<td>writing</td>
<td>reading</td>
</tr>
</tbody>
</table>
## Integrated ELD & Math Lesson

<table>
<thead>
<tr>
<th>Mathematics Content</th>
<th>Mathematical Practices</th>
<th>ELD Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Language & Learning Objective:

- Consider how and when students will read, listen, write, and speak throughout the lesson?
- How can you use these opportunities to build language?
Planning Mathematics Instruction and Integrated ELD

Table UA-3. Recommendations for Connecting Mathematical Content to Language

1. Focus on students’ mathematical reasoning, not accuracy in using language.
2. Shift to a focus on mathematical discourse practices; move away from simplified views of language.
3. Recognize and support students to engage with the complexity of language in math classrooms.
4. Treat everyday language and experiences as resources, not as obstacles.
5. Uncover the mathematics in what students say and do.

Source: Moschkovich 2012a, 5-8.

From CA Mathematics Framework, p. 685
Planning Mathematics Instruction and *Integrated ELD*

Table UA-3. Recommendations for Connecting Mathematical Content to Language

1. Focus on students’ mathematical reasoning, not accuracy in using language.
2. Shift to a focus on mathematical discourse practices; move away from simplified views of language.
3. Recognize the sociocultural, linguistic, and political contexts of ELD students.
4. Treat everyone as a language learner.
5. Uncover the potential in ELD students.

*Source: Moschkovich, N. J.*

**Effective instructional experiences for ELs throughout the day and across the disciplines:**

- Are interactive and engaging, meaningful and relevant, and intellectually rich and challenging
- Are appropriately scaffolded in order to provide strategic support that moves learners toward independence
- Develop both content knowledge and academic English
- Value and build on primary language and culture and other forms of prior knowledge

From CA Mathematics Framework, p. 685
CA ELA/ELD Snapshots

- There are Designated ELD Mathematics Snapshots for the following grade levels:
  - Transitional Kindergarten
  - 2nd Grade
  - 4th Grade
  - 7th Grade

- Consider: In what ways does the Designated ELD instruction support students in developing language while relating to the math content they are learning?
Sample I-ELD & D-ELD Mathematics Lessons

(DRAFT) Comparing Numbers and Place Value Relationships, Grade 4
Integrated ELD and Mathematics Instruction Vignette

Background
Mrs. Verner’s 30 fourth graders have been learning about place value during the first few weeks since school began. They are currently toward the end of their place value unit. Students have been engaged in lessons and math routines focused on their grade level standards for Number and Operations in Base Ten that are focused on place value. This will be one of their first experiences with a larger task focused on the same concepts. Students will work independently and collaboratively to learn about the same concepts.

Lesson Context
During the place value unit, students have explored place value through daily math routines. Students are able to identify the place value of a given digit, and can write numbers in standard form. Students compare numbers using their understanding of place value, standard, word, and expanded form. Students share numbers by identifying patterns and explaining their thinking. Mrs. Verner’s students have been working on developing understanding of concepts through the use of manipulatives and problem-solving strategies.

Lesson Excerpts
Mrs. Verner’s lesson provides students with the opportunity to apply what they have learned about place value. The lesson is designed to be taught with the base ten place value system and comparing numbers with place value relationships within the base ten system. Students will engage independently and collaboratively to learn about the relationships between the value of a digit in a number situation. Students will explore the relationship between the value of a digit in a number situation and the number itself. Students will work on this relationship in order to develop a deep understanding of the place value system.
Next Steps

- Write down 1-2 next steps for your work with Integrated ELD and mathematics.
- Share these with your table.
Resources

- CA Mathematics Framework, CA ELA/ELD Framework
- 5 Practices for Orchestrating Productive Mathematics Discussions, Mary Kay Stein, Margaret Schwan Smith
- Intentional Talk: How to Structure and Lead Productive Mathematical Discussions, Elham Kazemi, Allison Hintz
- Powerful Problem Solving Activities for Sense Making with the Mathematical Practices, Max Ray-Riek
- Notice and Wonder, Math Forum @ NCTM
Thank you! Enjoy the rest of your day!

Christine Roberts
christine.roberts@tcoe.org

@mathschrchristine

Access the resources on:
http://ccss.tcoe.org/math/presentations
Think about the quote. Respond with a thought or question on a post-it.

Once everyone has had time to respond, discuss as a table.

Move to the next quote.