Mathematics + Integrated ELD = Access and Deep Understanding

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Access the resources on Sched or on:
http://ccss.tcoe.org/

Session Outcomes

Participants will:

- Deepen their understanding of the CA Integrated ELD and Designated ELD.
- Discuss strategies that provide access and support opportunities for English learners while they engage in mathematics.
- Design an Integrated ELD and Math lesson.
Why do our students need to communicate when learning mathematics?

- How do we support students in becoming better communicators?
Why do our students need to communicate when learning mathematics?

- How do we support students in becoming better communicators?
- How do we provide opportunities for students to communicate their thinking?

California Mathematics Framework

“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
What are Designated ELD & Integrated ELD?

How do they support student learning?

ELD in the Framework: A Dual Approach

**Designated ELD**

Use the CA ELD standards “as the focal standards in ways that build into and from content instruction” in order to develop language essential to content learning in English.

**Integrated ELD**

ALL teachers with ELs in the classroom use CA ELD “in tandem with the focal CA [Standards] for ELA/literacy and other content standards.”

CA ELA/ELD Framework, Ch 2
BOTH/AND

INTEGRATED ELD

processing and comprehending content

DESIGNATED ELD

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

Extended Academic Discourse

Expressive

Receptive

Expressive

Receptive

Expressive

Receptive

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

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<thead>
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**RECEPTIVE + EXPRESSIVE = Understanding**
CA ELA/ELD Snapshots

- Read the Designated ELD Connected to Mathematics Snapshots for your grade span.
  - Transitional Kindergarten
  - 2nd Grade
  - 4th Grade
  - 7th Grade
- In what ways does the Designated ELD instruction support students in developing language while relating to the math content they are learning?

What does integrated ELD look like?

Collaboration through language

Interpretation of language

Production of language
3 Modes of Communication in Mathematics Sort

- Read the cards in your sort bag.
- Discuss whether each card best reflects an example of the collaborative, interpretive, or productive mode of language.
- Sort into these three groups.

<table>
<thead>
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<th>PRODUCTIVE</th>
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Standards for 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.
# 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.

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## Supporting Sense-Making and Communication

- 5 Practices for Orchestrating Productive Mathematics Discussions
  - Anticipate, Monitor, Select, Sequence, Connect
- Language Scoop
- Talk Moves
  - Revoicing, Repeating, Reasoning, Adding On, Wait Time, Turn-and-Talk, Revise
- Notice/Wonder
- Read and Flip for Math Stories
Raising Money

Louis wants to give $15 to help kids who need school supplies. He also wants to buy a pair of shoes for $39. He gets $5 a week for his allowance. Louis remembers his sister’s birthday is next month. He sets a goal of saving $16 for her gift. How many weeks does he have to save his allowance for all three of his goals?

Adapted from Illustrative Mathematics, https://www.illustrativemathematics.org/content-standards/tasks/1309

Select, Sequence, & Share

Let’s discuss our thinking.
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.

Supporting Mathematical Communication

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

5 Practices
For Orchestrating Productive Mathematical Discussions

- Anticipate
- Monitor
- Select
- Sequence
- Connect

Talk Moves

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

Read and Flip
Strategy for 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?

Let’s plan an Integrated ELD & Mathematics Lesson
Collaboratively Plan an Integrated ELD Lesson

Use the provided grade level ELD Standards and Illustrative Task to plan your integrated ELD and mathematics lesson.

- 1st – At the Park, 1.OA.1
- 6th – Making Hot Cocoa, 6.NS.1
- 9th – Interpreting Functions, F-IF.B.4

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

Integrated ELD & Math Lesson

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Language & Learning Objective:

Launch

Explore

Summarize
2. For what purpose will students use language? What will it look and sound like? (What is the language function? What are the language demands?)

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?

In an academic setting, students use language functions in order to express ideas, communicate with others, and demonstrate their understanding of content.
Language Functions

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

Language Demands

Mathematics:

- Superlatives (ex. biggest)
- Words converted into numbers
- Complex words or phrases
- Infinitives (ex. to convert fractions . . .)
- Comparatives
- Adverbial clauses
- Negotiations in questions
- Word order
- Change in verbs to adjust to different tenses

Mathematical symbols
- Reordering language to go from “question form” to “answer form”
- Language required to explain and elaborate
- Multiple meaning words
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

Integrated ELD & Math Lesson

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Language & Learning Objective:

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Begin thinking about your language objective . . .
4. 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?)

ELD Standards - Understanding Part I

California Department of Education
English Language Development Standards for Grade 6

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, discourse, and genre. They read grade-level literary and informational text, and use text evidence to develop arguments and support claims, understanding that evidence must be coherent, relevant, and authoritative. They analyze grades-level and complex text, distinguishing main ideas and supporting details, and connecting ideas presented in different media formats. They read texts that are linguistically challenging and 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-modality language processes (structuring cohesive texts, expanding and enriching ideas, and connecting and condensing ideas) using various linguistic resources.

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-modality language processes (structuring cohesive texts, expanding and enriching ideas, and connecting and condensing ideas) using various linguistic resources.

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Corresponding Common Core State Standards for English Language Arts

- SL.6.1.6, SL.6.3.6
- W.6.1.4, W.RST.6.4, SL.6.1.6, SL.6.3.6
- W.6.1.5, W.RST.6.5, SL.6.1.6, SL.6.3.6
- W.6.1.6, W.RST.6.6, SL.6.1.6, SL.6.3.6
- W.6.1.7, W.RST.6.7, SL.6.1.6, SL.6.3.6
- SL.6.1.8, SL.6.3.6
- RL.6.1.9-10, RL.6.1.11-12, RH.6.1.1-10, RST.6.1.3, RL.6.2.10, RL.6.2.11, RL.6.3.6
- RL.6.4.5, RL.6.4.8, RH.6.4.5, RST.6.4-5, SL.6.4-5, SL.6.5.6
- RL.6.4.9, RL.6.4-5, RST.6.4-5, SL.6.4-5, SL.6.5.6
- RL.6.4.6, RL.6.5.6
- W.6.4-5, W.RST.6.6, SL.6.4-5, SL.6.5.6, SL.6.5.6
- W.6.5.8, W.RST.6.8, SL.6.4-5, SL.6.5.6, SL.6.5.6

California English Language Development Standards for Grade 6—October 5, 2012

1
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?

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**ELD Standards - Understanding Part II**

<table>
<thead>
<tr>
<th>Part II: Learning About How English Works</th>
<th>Corresponding Common Core State Standards for English Language Arts*</th>
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<tr>
<td><strong>A. Structuring Cohesive Texts</strong></td>
<td>* RL.6.5; RI.6.5; RH.6.5; RI.6.5; W.6.1-2, 4-5, 10, SL.6.6</td>
</tr>
<tr>
<td>1. Understanding text structure</td>
<td>* RI.6.5; RH.6.5; RI.6.5; W.6.1-2, 4-5, 10, L.6.1-3.6</td>
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<tr>
<td>2. Understanding cohesion</td>
<td>* W.6.5; WHST.6.5; SL.6.6; L.6.1-3.6</td>
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<td><strong>B. Expanding and Enriching Ideas</strong></td>
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<td>3. Using verbs and verb phrases</td>
<td>* W.6.4-5; WHST.6.4-5; SL.6.6; L.6.1-3.6</td>
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<tr>
<td>4. Using nouns and noun phrases</td>
<td>* W.6.6-7; WHST.6.6-7; SL.6.6; L.6.1-3.6</td>
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<tr>
<td>5. Modifying to add details</td>
<td>* W.6.8-9; WHST.6.8-9; SL.6.6; L.6.1-3.6</td>
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<tr>
<td><strong>C. Connecting &amp; Condensing Ideas</strong></td>
<td>* W.6.1-5, WHST.6.1-2, 4-5; SL.6.6-7; L.6.1-3.6</td>
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<tr>
<td>6. Connecting ideas</td>
<td>* W.6.1-5, WHST.6.1-2, 4-5; SL.6.6-7; L.6.1-3.6</td>
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<td>7. Condensing ideas</td>
<td>* W.6.1-5, WHST.6.1-2, 4-5; SL.6.6-7; L.6.1-3.6</td>
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**Part III: Using Foundational Literacy Skills**

* RF.K.1-3.4; RF.3.1-3.4 (as appropriate)

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*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.*
Integrated ELD & Math Lesson

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Language & Learning Objective:

- Launch
- Explore
- Summarize

Complete your language objective.

5.

How are students using language expressively and receptively throughout the lesson?
Learning Mathematics in Every Classroom, Every Day

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Supporting Sense-Making and Communication

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Read and Flip
Strategy for Word Problems

Talk Moves
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- Turn-and-Talk
- Revise

Language Scoop
“Teach Explicitly, Practice Abundantly”

Word Banks
Practice the proficient use of language
Classification
Structured discourse frames

Structured Discourse Frames

Compare:
_____ has more than _____ because . . .
____ and ____ are similar because...
____ and ____ both have...
Both ___ and ___ are...
One thing ___ and ___ have in common is...
Expressive & Receptive Language in Mathematics

- Consider how and when students will read, listen, write, and speak throughout the lesson?
- What is the purpose of each of these opportunities to use language?
- How can you use these opportunities to build language?

Integrated ELD & Math Lesson

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Language & Learning Objective:

- Launch
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- Summarize
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
Next Steps

- Write down a next step for your work with Integrated ELD and mathematics.

- **Share these** with your table.
Resources

- TCOE Common Core Connect Website
- 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 conference.

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Access the resources on Sched or on: [http://ccss.tcoe.org/](http://ccss.tcoe.org/)
Your feedback is appreciated.

Send your text message to: 37607

Type: 580394 (0-3)(0-3)(0-3) other comments or feedback in words

Well prepared and knowledgeable
Engaging and effective
Session matched description

Strongly Disagree Disagree Agree Strongly Agree
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