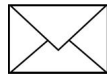


Navigate your Mathematics + Integrated ELD Journey

Christine Roberts

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



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[@tcoechristine](https://twitter.com/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?



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

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



EXPRESSIVE + RECEPTIVE

=

Understanding

Exploratory Talk vs. Presenter Talk

Exploratory Talk is...

- Half formed ideas
- Teacher intervenes to support, not give ideas

Honor student thinking/talk in their own words.

How do things make sense to you?



Presenter Talk is...

- Polished
- Dense
- May use standard terms and representations



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*

Notice &
Wonder

Stronger & Clearer

Collect & Display

Critique, Correct,
& Clarify

Read and Flip/3 Reads/
Numberless Word
Problems

What do you notice? What do you wonder?

4



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

Mathematic-specific	Generalized
<ul style="list-style-type: none">● Revoicing● Repeating● Reasoning● Adding On● Wait Time● Turn-and-Talk● Revise <p>(Chapin, O'Connor, & Anderson, et.al.,Kazemi & Hintz)</p>	<ul style="list-style-type: none">● Elaborate & Clarify● Supporting Ideas with Examples● Build On or Challenge a Partner's Ideas● Paraphrase● Synthesize Conversation Points <p>(Zwiers & Crawford)</p>

Select, Sequence, & Share



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

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Mathematical Discussions

Anticipate
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Sequence
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Talk Moves

*Revoicing
Repeating
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Notice &
Wonder

Stronger & Clearer

Collect & Display

Critique, Correct,
& Clarify

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

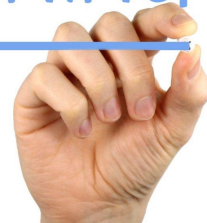
- How will students interact meaningfully with the mathematics?
- How will students make sense of the language of mathematics (text, diagrams, symbols) and the English language?
- How will students communicate their understanding?

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

PLANNING



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?

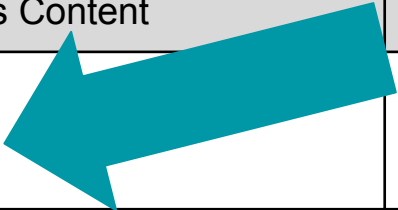

How are students using language expressively and receptively throughout the lesson?

1.

What do you want
students to do?

(What's the mathematics learning goal?)

Integrated ELD & Math Lesson

Mathematics Content	Mathematical Practices	ELD Standards
		
Language & Learning Objective:		
Launch		
Explore		
Summarize		

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.

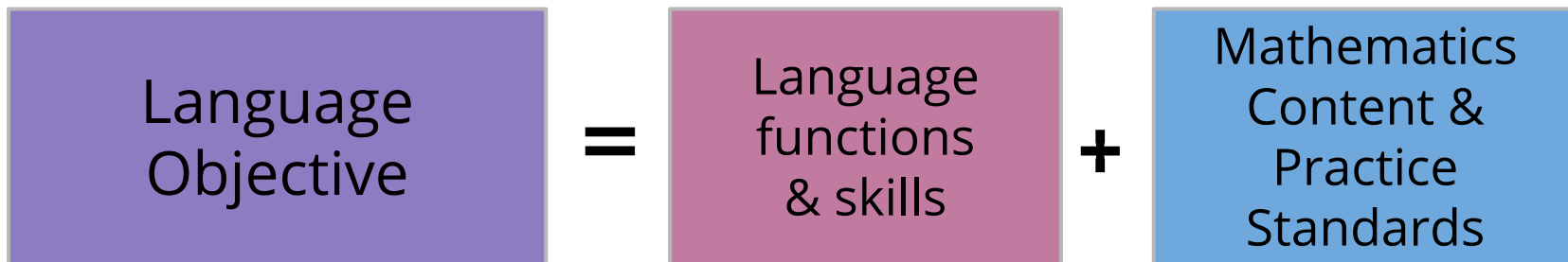
- What do students do with language as they engage with content and interact with others?
- How do students represent the active use of language for a particular everyday purpose?

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

California Department of Education English Language Development Standards for Grade 6

Section 1: Goal, Critical Principles, and Overview

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

Part I: Interacting in Meaningful Ways

Corresponding Common Core State Standards for English Language Arts*

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)

- SL.6.1,6; L.6.3,6
- W.6.6; WHST.6.6; SL.6.2; L.6.3,6
- W.6.1; WHST.6.1; SL.6.1,4,6; L.6.3,6
- W.6.4-5; WHST.6.4-5; SL.6.6; L.6.1,3,6

B. Interpretive

5. Listening actively to spoken English in a range of social and academic context
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

- SL.6.1,3,6; L.6.1,3,6
- RL.6.1-7,9-10; RI.6.1-10; RH.6.1-10; RST.6.1-10; SL.6.2; L.6.1,3,6
- RL.6.4-5; RI.6.4,6,8; RH.6.4-6,8; RST.6.4-6,8; SL.6.3; L.6.3,5-6
- RL.6.4-5; RI.6.4-5; RH.6.4-5; RST.6.4-5; SL.6.3; L.6.3,5-6

C. Productive

9. Expressing information and ideas in formal oral presentations on academic topics
10. Writing literary and informational texts 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 language structures to effectively convey ideas

- SL.6.4-6; L.6.1,3
- W.6.1-10; WHST.6.1-2,4-10; L.6.1-6
- W.6.1,8-9; WHST.6.1,8-9; L.6.1-3,6
- W.6.4-5; WHST.6.4-5; SL.6.4,6; L.6.1,3,5-6

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?

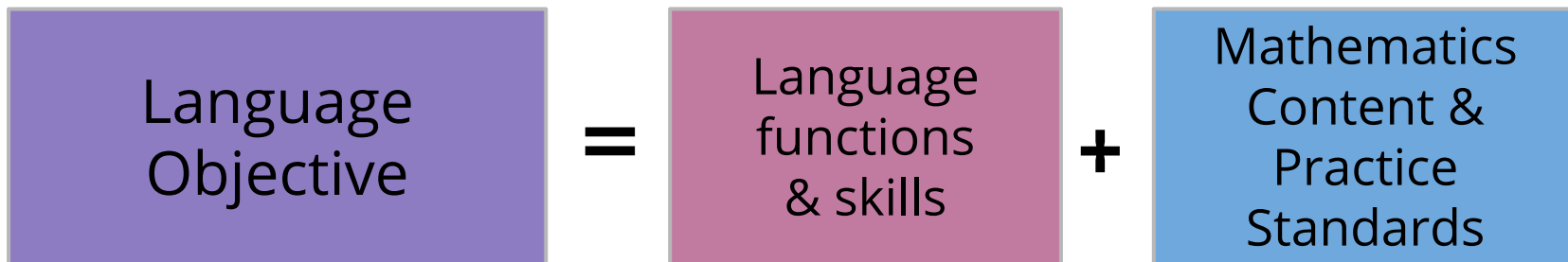
ELD Standards - Understanding Part II

California Department of Education
English Language Development Standards for Grade 6

Part II: Learning About How English Works	Corresponding Common Core State Standards for English Language Arts*
A. Structuring Cohesive Texts 1. Understanding text structure 2. Understanding cohesion	 <ul style="list-style-type: none">• 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• RI.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
B. Expanding and Enriching Ideas 3. Using verbs and verb phrases 4. Using nouns and noun phrases 5. Modifying to add details	 <ul style="list-style-type: none">• W.6.5; WHST.6.5; SL.6.6; L.6.1,3-6• W.6.5; WHST.6.5; SL.6.6; L.6.1,3-6• W.6.4-5; WHST.6.4-5; SL.6.6; L.6.1,3-6
C. Connecting & Condensing Ideas 6. Connecting ideas 7. Condensing ideas	 <ul style="list-style-type: none">• W.6.1-5; WHST.6.1-2,4-5; SL.6.4,6; L.6.1,3-6• W.6.1-5; WHST.6.1-2,4-5; SL.6.4,6; L.6.1,3-6
Part III: Using Foundational Literacy Skills	•RF.K-1.1-4; RF.2-5.3-4 (as appropriate)
* 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).



Integrated ELD & Math Lesson

Mathematics Content	Mathematical Practices	ELD Standards
Language & Learning Objective:		
Launch		
Explore		
Summarize		

Write your language objective.

Identify your ELD Standard(s).

3.

How are students using language expressively and receptively throughout the lesson?

Learning Mathematics & Language in Every Classroom, Every Day



Supporting Sense-Making and Language Development

5 Practices

For Orchestrating Productive
Mathematical Discussions

Anticipate

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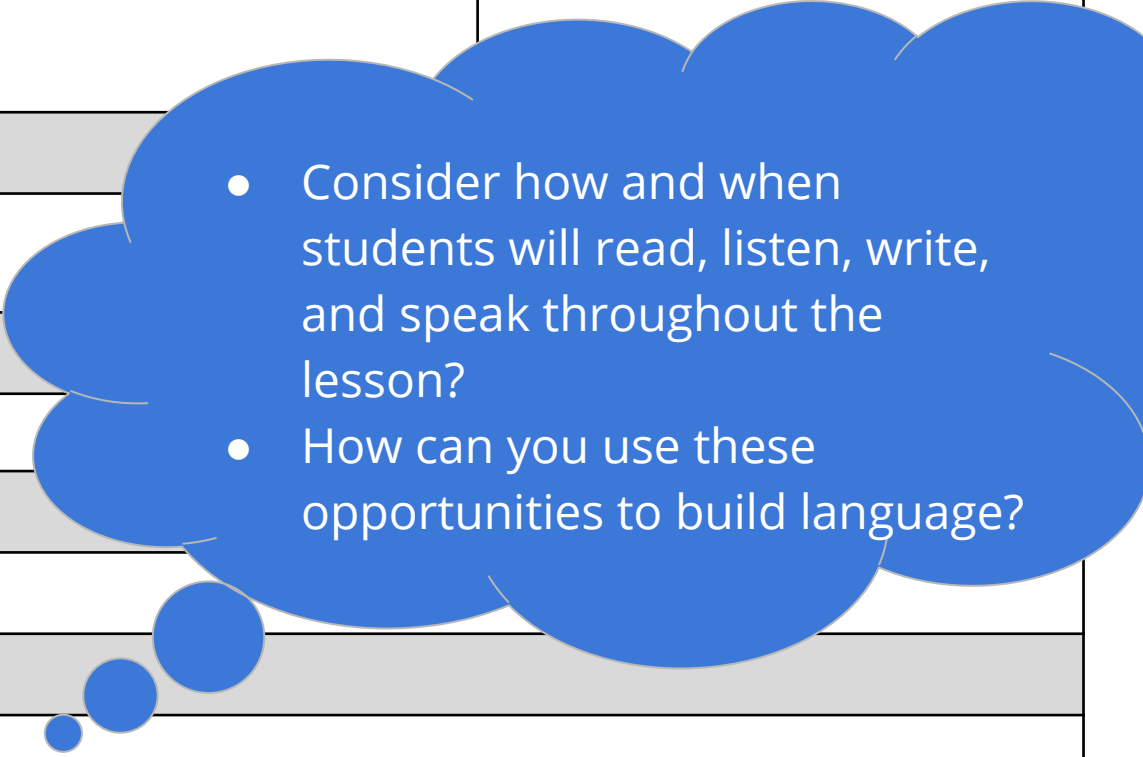
Collect & Display

Critique, Correct,
& Clarify

Read and Flip/3 Reads/
Numberless Word
Problems

Integrated ELD & Math Lesson

Mathematics Content	Mathematical Practices	ELD Standards
Language & Learning Objective:		
Launch		
Explore		
Summarize		



- 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.

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

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

4. Treat every

- Are interactive and engaging, meaningful and relevant, and intellectually rich and challenging

5. Uncover t

- Are appropriately scaffolded in order to provide strategic support that moves learners toward independence

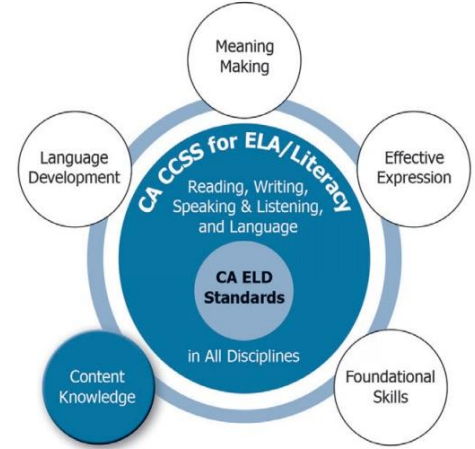
Source: Moschkovi

- Develop both content knowledge and academic English

- Value and build on primary language and culture and other forms of prior knowledge

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. Verners' 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 in their table groups during the task.

The students at the school are predominately hispanic and over half of the students are English Learners. Almost 90% of the students receive free and reduced lunch. Mrs. Verners has 11 students at the Emerging level, 5 at the Expanding level, and 2 at the Bridging level. Students with disabilities are included in all mathematics instruction. The fourth grade team of teachers at this school meets weekly to discuss and plan their math lessons, discussing instructional strategies and resources they are using.

Lesson Context

During the place value unit, students have explored place value through daily math lessons and routines. Students are able to identify the place value of given digits, and can write numbers in standard, word, and expanded form. Students compare numbers using their understanding of value and inequality symbols. They have had some experiences describing these comparisons and through writing. Mrs. Verners is working to develop student understanding of how numbers within the place value system are related through multiplying and dividing by ten. Students analyzed the relationship between the value of a digit in two locations within a number. They understand that in the number 5,500, the 5 in the thousands place is ten times greater in value than the 5 in the hundreds place. In this task, they will explore the relationship between values as they compare several different numbers.

Lesson Excerpts

Mrs. Verners' lesson provides students the opportunity to apply what they have learned about relationships within the base ten place value system and comparing numbers with the real world situation. Students will engage independently and collaboratively with the task. The focus of the relationship between the value of a digit located in two locations within a number. Students will create a plan for their work on this task.

Lesson Title: 4.3 Interpret the Remainder
Chapter/Unit: Chapter 4 Divide by 1 – Digit Numbers

Mathematics Content	Mathematical Practices	ELD Standards
4.OA.B Solve word problems and make sense of the remainders in context of the situation.	SMP 1 – Make Sense of Problems and Persevere in Solving Them – Solution pathways, reasonableness SMP 2 – Reason Abstractly and Quantitatively - Contextualize and decontextualize SMP 3 – Construct Viable Arguments and Critique the Reasoning of Others – Create arguments and support with reasons.	ELD.PI.4.11a Support opinions (thoughts) by expressing reasons w/evidence. (Productive) ELD.PI.II.4.6 Combine clauses to make connections between and join ideas in sentences. Such as, but, so (for, and, nor, but, or, yet, so).

Language & Learning Objective:

Students will make sense of remainders in context, orally supporting their thinking with reasons and evidence from their work and from the text (word problems).

Launch

- p. 152 Read & flip w/van problem
- 1st Read – Choral, Retell
 - 2nd Read – T. fluency read, Ss mark the text, Create answer statements
 - 3rd Read – Independently read, discuss 1st step & why

Group Discussion Sentence Frames:

- The answer is _____, so they will need _____ because _____.
- I got _____ so _____.
- My solution is _____.

Next Steps

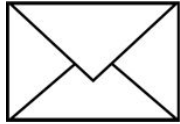
- Write down 1-2 next steps for your work with Integrated ELD and mathematics.
- *Share these* with your table.



Resources

- CA Mathematics Framework, CA ELA/ELD Framework
- Principles for the Design of Mathematics Curricula: Promoting Language and Content Development, http://ell.stanford.edu/sites/default/files/u6232/ULSCALE_T oA Principles MLRs Final v2.0 030217.pdf
- *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

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@mathschristine

Access the resources on:

<http://ccss.tcoe.org/math/presentations>

Quote Cafe

"Educators should not confuse students' language ability with their mathematical understanding."



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.