

Great teachers aren't born;
THEY'RE TAUGHT.



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What is the Use of Instructional Materials in Practice?

Deborah Loewenberg Ball

CCSSO IMPD Network Conference
February 26, 2020 • Washington D.C.



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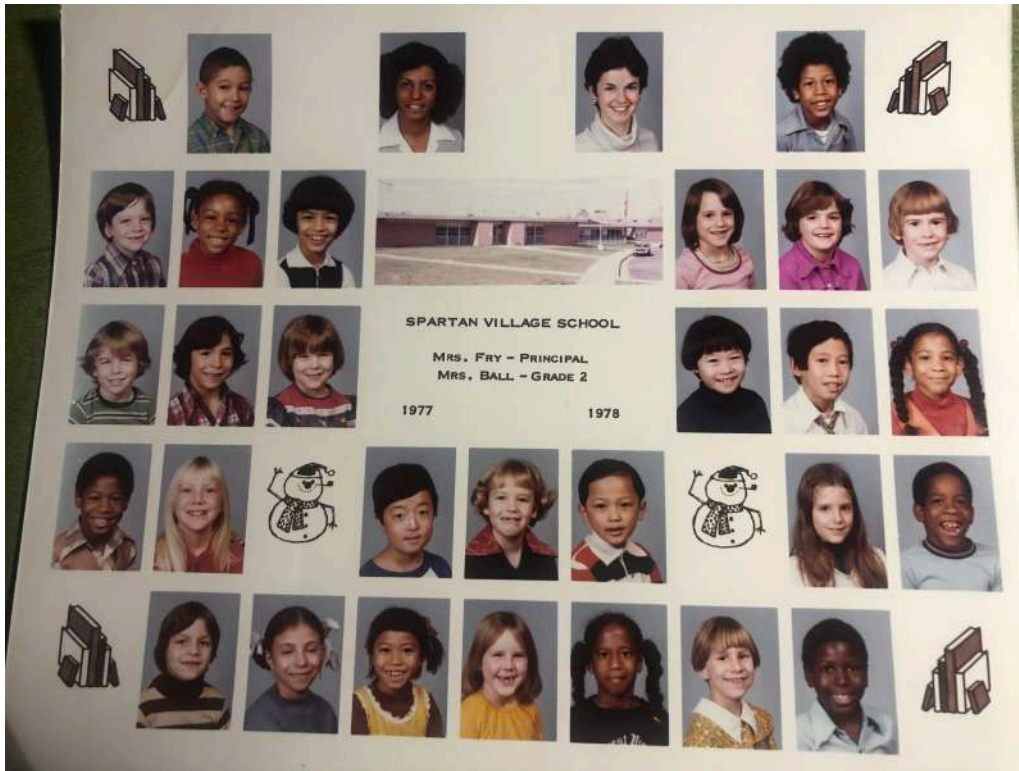
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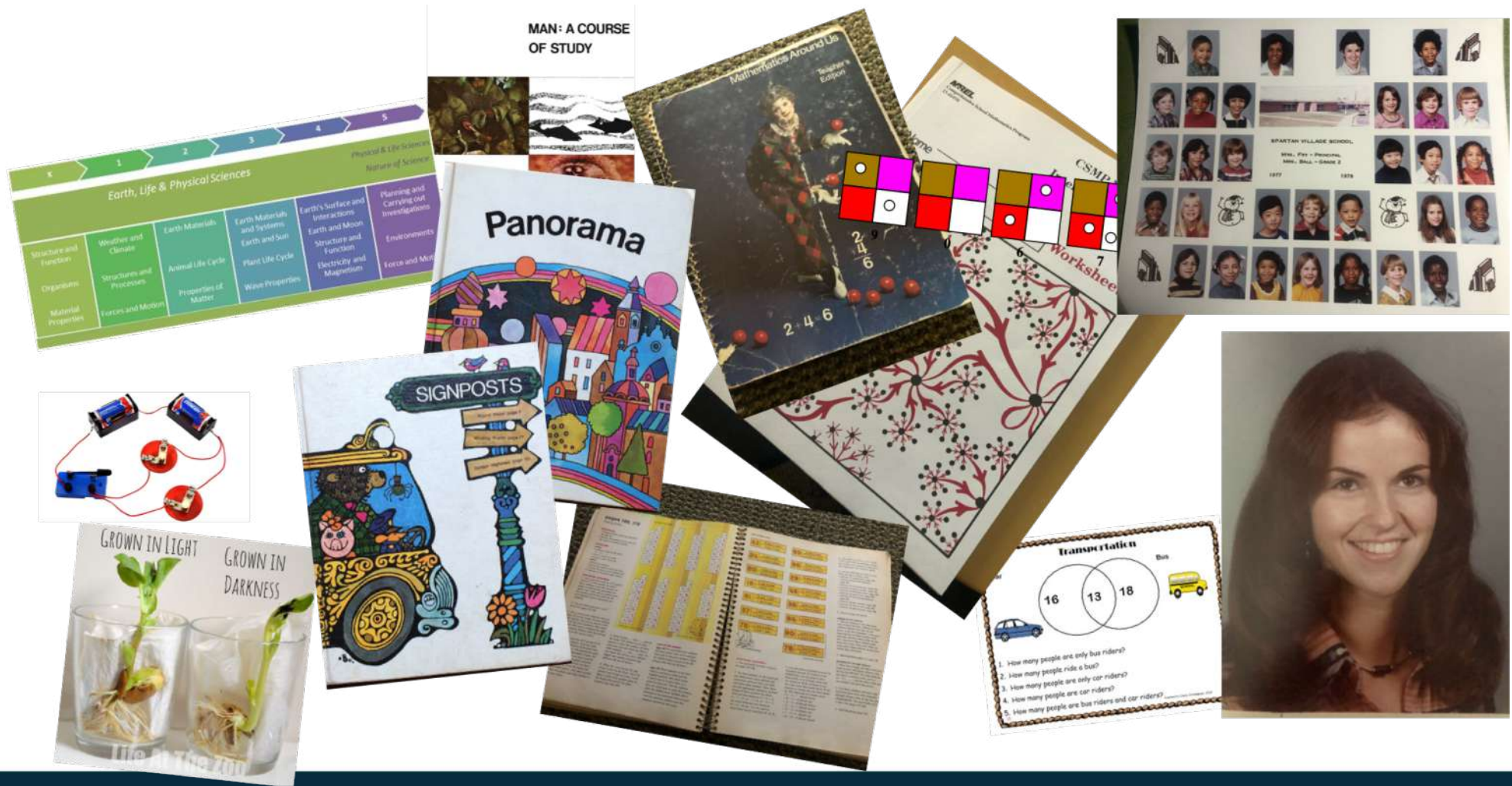
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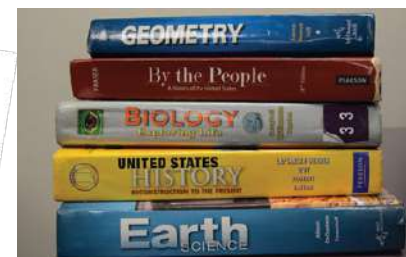
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The Promise of “High-Quality” Curriculum is Not New

“Instructional materials are concrete and daily. They are the stuff of lessons, of what teachers and students *do*. That centrality affords curricular materials a uniquely intimate connection to teaching.” (p. 6)



Ball, D. L., & Cohen, D. K. (1996). Reform by the book: What is—or might be—the role of curriculum materials in teacher learning and instructional reform? *Educational Researcher*, 25(9), 6–8, 14.

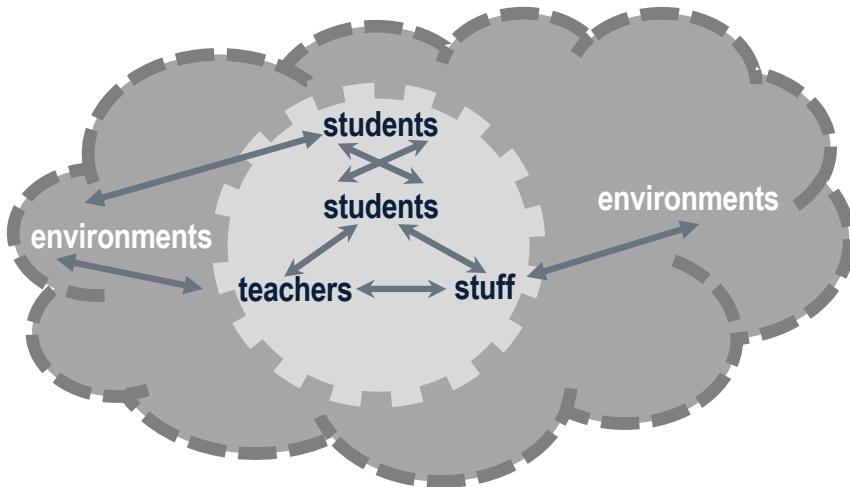
But . . . Their Promise Has Often Remained Unrealized

There is a gap between instructional materials as **resources** and their use in and for high-quality instruction.

“Curriculum materials could contribute to professional practice if they were designed with closer attention to processes of curriculum *enactment*.” (p. 7, Ball & Cohen, 1996)

Further:

Curriculum materials could play a crucial role in the quality of beginning teaching if we considered the work of **use** and designed teacher preparation and induction support around learning to use instructional materials.



Overview

1. (How) could instructional materials contribute to the quality of beginning teaching?
2. What is the work of using instructional materials in teaching?
3. How could beginning teachers be prepared and supported for using curriculum materials?



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1. (How) Can Instructional Materials Contribute to the Quality Of Beginning Teaching?



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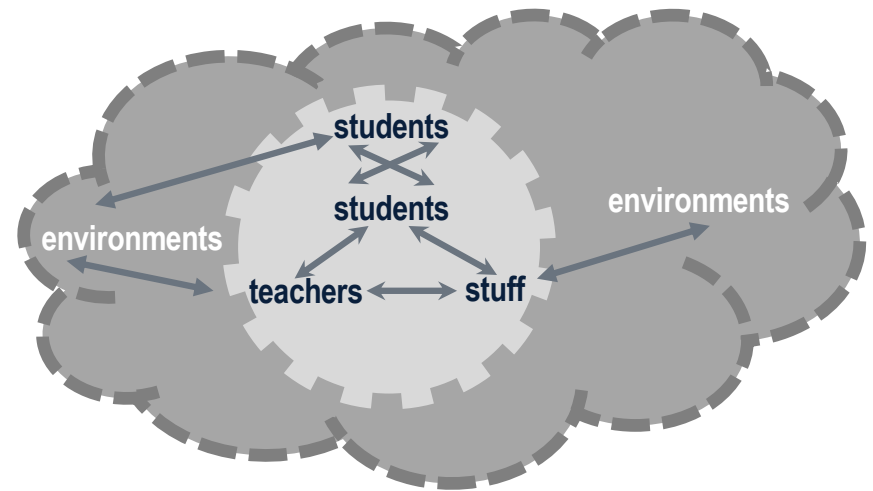
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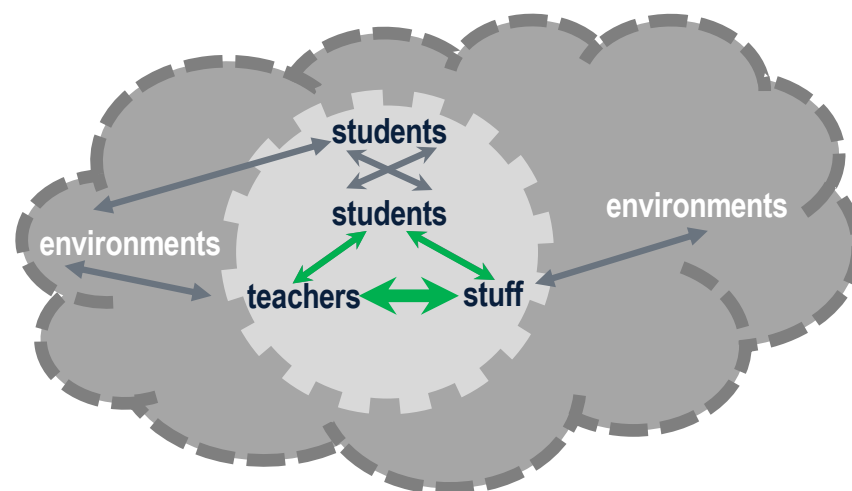
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What Can Curriculum Materials Provide for Teaching, and Thus, for Beginning Teachers?

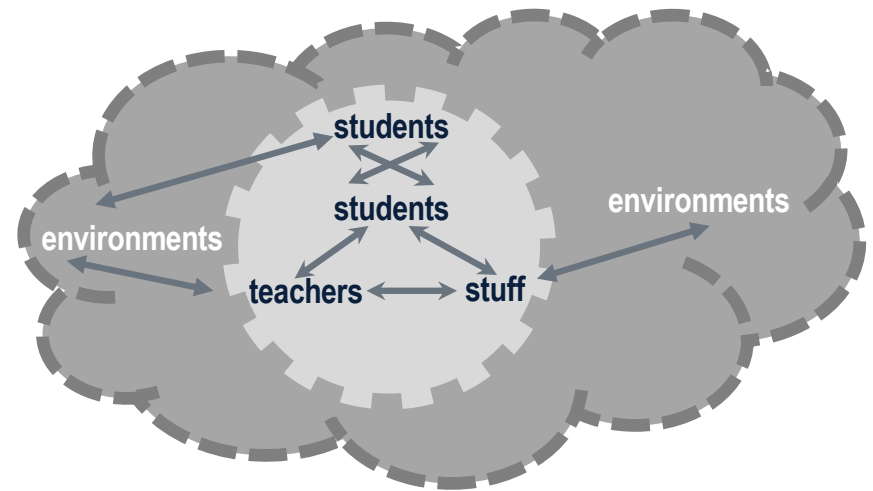


What Can Curriculum Materials Provide for Teaching, and Thus, for Beginning Teachers?

- Clear articulation of learning goals aligned to standards
- Explanations of the content from the perspective of content knowledge for teaching
- Insights into how students might think and how students' knowledge and experience might interact with the content
- A range of instructional activities and tasks well-coordinated to the learning goals
- Sequenced, learning trajectories, coherence

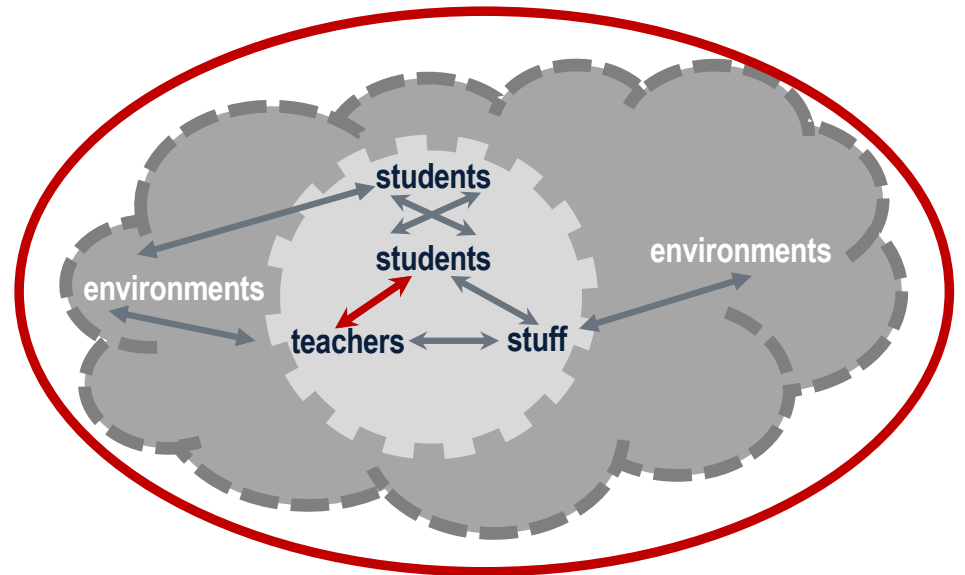


What Can Curriculum Materials Not Provide?



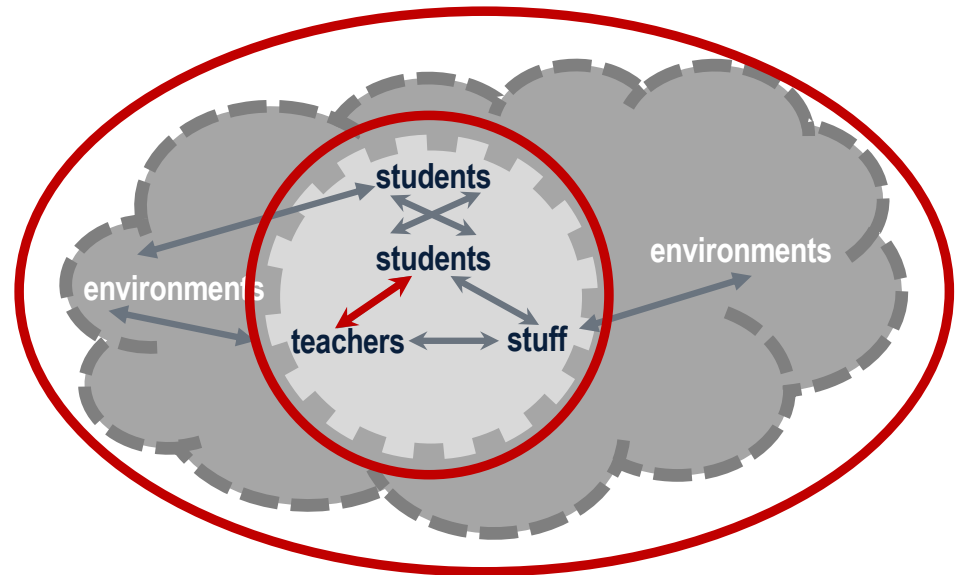
What Can Curriculum Materials Not Provide?

- Knowledge about your own students, their contexts, communities, resources, past learning



What Can Curriculum Materials Not Provide?

- Knowledge about your own students, their contexts, communities, resources, past learning
- Plans for teaching your students in your class, your classroom culture and norms, and the details of instructional practice (e.g., time needed for a specific point)



So we have two big questions if we want this time to realize the promise of good instructional material to support high-quality instruction by beginning teachers:

1. What is the work of using instructional materials in teaching?
2. How could beginning teachers be prepared and supported for using curriculum materials?



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2. What is the Work of Using Instructional Materials in Teaching?



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We start with a brief stop in a beginning teacher's classroom.

Serena is in her second year of teaching.

Her school provides a strong standards-aligned textbook for math.

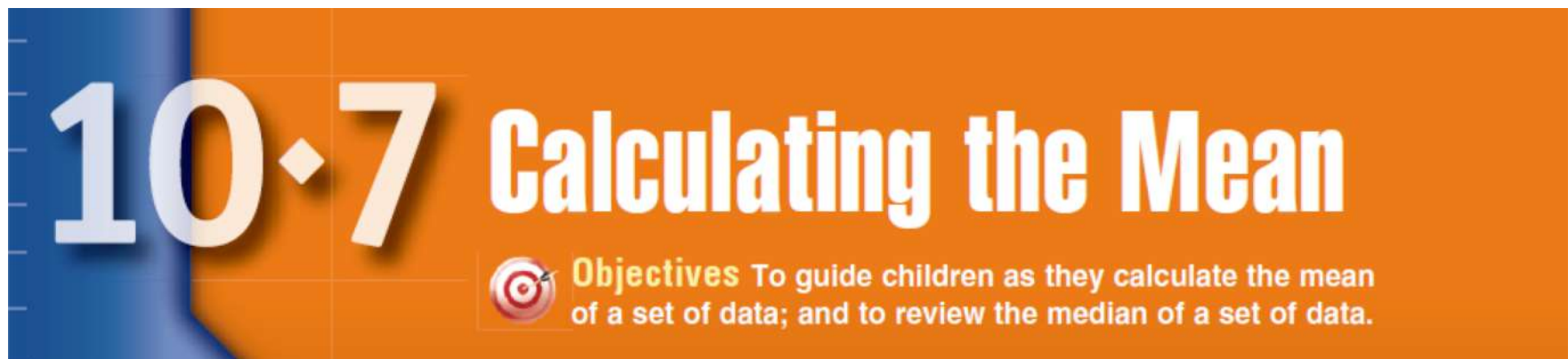
We'll see her use it to teach a lesson on “mean,” or “average.”

A Common Learning Goal: Averages


CCSS.MATHCONTENT.6.SBP.4 Summarize and describe distributions.
Giving quantitative measures of center (median and/or mean).

(What *is* an “average”? How would you explain it, without just stating the *process* to calculate an average?)

Using Instructional Materials to Teach this Standard



10•7 **Calculating the Mean**

 **Objectives** To guide children as they calculate the mean of a set of data; and to review the median of a set of data.

Examples used during the presentation were drawn from third-grade curriculum materials in Everyday Mathematics. For more information, see <http://everydaymath.uchicago.edu/>.

What Do Serena's Curriculum Materials Provide Her?

In the Materials?

- Clear articulation of learning goals aligned to standards
- Some instructional materials (but without annotation about their potential pitfalls and guidance for how to modify them)

Not in the Materials?

- Knowledge about her own students, their contexts, communities, resources, past learning
- Plans for teaching her students in her class, her classroom culture and norms, and the details of instructional practice (e.g., time needed for a specific point)
- Explanations of the content from the perspective of content knowledge for teaching
- Insights into how students might think and how students' knowledge and experience might interact with the content
- A range of instructional activities and tasks well-coordinated to the learning goals

Serena's Teaching: Viewing Focus

1. How is the instructional material shaping this teacher's lesson?
2. What is the mathematical point of this lesson, according to the teacher's guide?
3. What issues arise that the instructional material does not provide guidance for?

Video: Serena's lesson on calculating the mean



Discuss

- How is the instructional material shaping this teacher's lesson?
- What is the mathematical point of this lesson, according to the teacher's guide?
- What issues arise that the instructional material does not provide guidance for?

What Work Does Serena Need to Be Able to Do to Use this Instructional Material to Enact High-Quality Instruction?

1. Identify the main mathematical point of the lesson and the role of the activity to support the learning goals.
 - Is it about *calculating* an average or is it about the *concept* of “average” and what it means?
2. Consider what her students might say or do, and what they might need support with, e.g.,:
 - The terms “average” and “mean”: what other experiences with and knowledge of these words might the children already have?
 - The difference between averages, equal, and fairness; what the term “mean” refers to
3. Develop a complete plan for teaching the lesson, including details, e.g.,:
 - See problems with the “arm span” context and modify the task from arm span to something mathematically similar, but more useful for understanding the concept (e.g., not different amounts of candy, but different distances or lengths) and the same complexity.
 - Whether and how to use calculators
 - Planning how the discussion of the results will go: how to launch and conclude, specific questions to ask, how to use the board

What Can Instructional Materials Provide?

In the Materials?

- Clear articulation of learning goals aligned to standards
- Explanations of the content from the perspective of content knowledge for teaching
- Insights into how students might think and how students' knowledge and experience might interact with the content
- A range of instructional activities and tasks well-coordinated to the learning goals

Not in the Materials?

- Knowledge about your own students, their contexts, communities, resources, past learning
- Plans for teaching your students in your class, your classroom culture and norms, and the details of instructional practice (e.g., time needed for a specific point)

What is the Work of Using Instructional Materials?

1. Identify the core concepts and fundamental skills and practices in a unit or lesson and the most critical tasks and activities intended to support work on these concepts, skills, and practices.
2. Identify the role of other activities and tasks (e.g., review, reinforcement, challenge, supplement) and evaluate the relative importance of these and whether and how much time to devote to them.
3. Consider one's own students, their resources and ways of reasoning, and how the lesson might play out with them, and determine ways to connect, scaffold, structure the work.
4. Develop a complete plan to use for teaching the lesson in your classroom (consider children, physical environment, time factors, language, materials, pacing, assessment).



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3. How Could Beginning Teachers Be Prepared and Supported For Using Curriculum Materials?



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Preparing Beginning Teachers for Using Instructional Materials in Teaching

1. Learning to prepare for the core content, skills, and practices and the alignment of the tasks and activities with the learning goals
2. Learning to coordinate an instructional design with your own students and context
3. Learning to use the written guidance to develop a complete plan to use for instruction

Decomposition of the practice of *Using Instructional Materials*, developed at TeachingWorks (2020)

1. Learning to Prepare for the Core Content, Skills, and Practices and the Alignment of the Tasks and Activities with the Learning Goals

Fractions as Numbers

Topic D: Fractions on the Number Line Students transfer their work to the number line in Topic D. They begin by using the interval from 0 to 1 as the whole. Continuing beyond the first interval, they partition, place, count, and compare fractions on the number line. (3.NF.3d)

Topic D: Fractions on the Number Line

LESSONS 14-19

In Topic C, students compared unit fractions and explored the importance of specifying the whole when doing so. In Topic D, they apply their learning to the number line. Number bonds and fraction strips serve as bridges into this work. Students see intervals on the number line as wholes. They initially measure equal lengths between 0 and 1 with their fraction strips. They then work with number lines that have endpoints other than 0 and 1 or include multiple whole number intervals. This naturally transitions into comparing fractions with the same denominator, as well as fractional numbers and whole numbers on the number line. As students compare, they reason about the size of fractions and contextualize their learning within real-world applications.

Note: Examples are drawn from third-grade curriculum materials in Zearn Math. For more information, see <https://www.zearn.org/>.




Grade 3, Mission 5
Fractions as Numbers

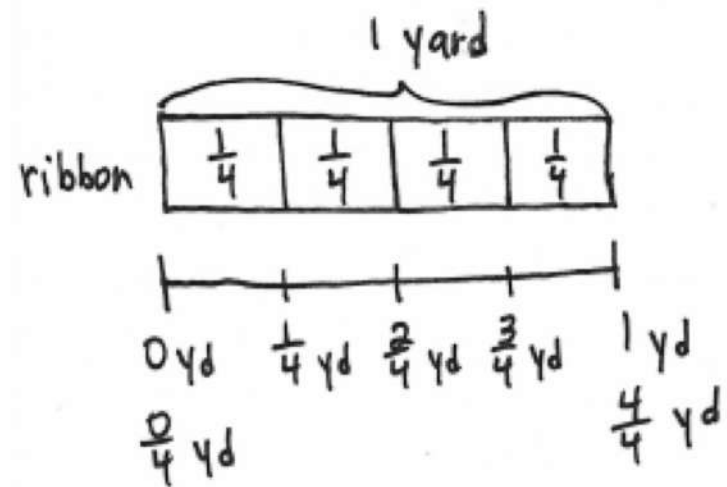
LESSON 16

Word Problem (7 min)

Hannah bought 1 yard of ribbon to wrap 4 small presents. She wants to cut the ribbon into equal parts. Draw and label a number line from 0 yards to 1 yard to show where Hannah will cut the ribbon. Label all the fractions, including 0 fourths and 4 fourths. Also, label 0 yards and 1 yard.

 **Note:** This problem reviews the concept of placing fractions on a number line from Small Group Lessons 14 and 15.

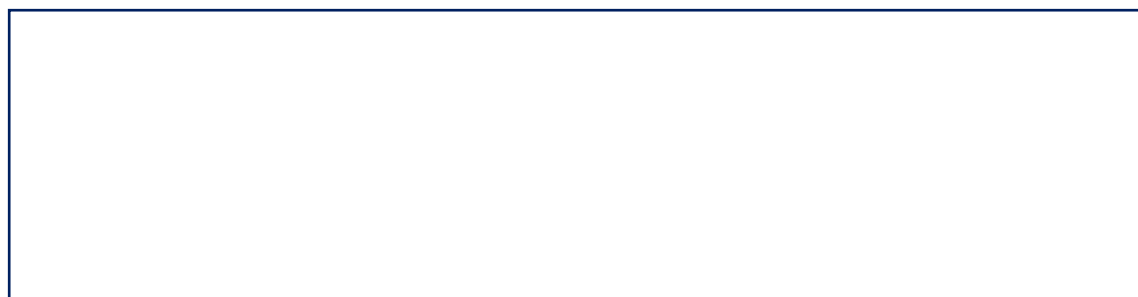
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1. Do the problem yourself

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- a) What is the core mathematical concept?
- b) What is the mathematical skill or practice?

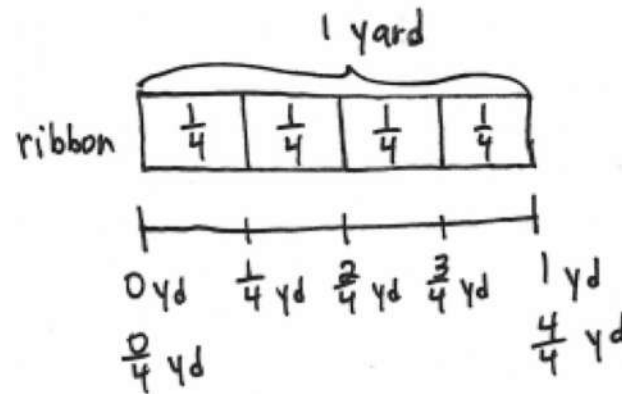
2(a). What is the core mathematical concept?



Note: This problem reviews the concept of placing fractions on a number line from Small Group Lessons 14 and 15.

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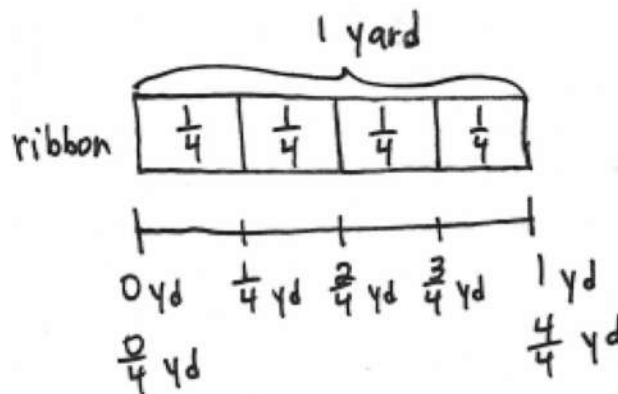
2(a). How does this problem relate to the core concept?



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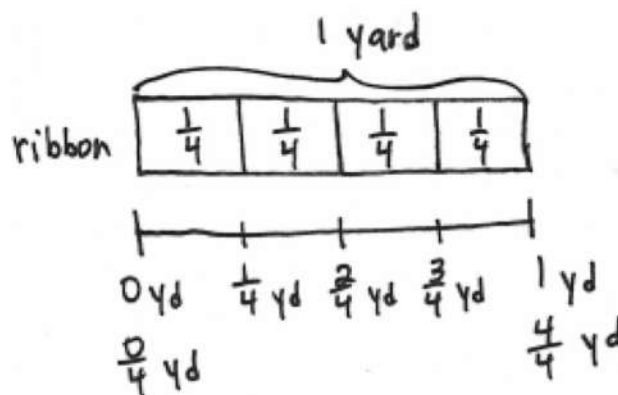
- The ribbon is supposed to model the number line.
- The whole is the yard of ribbon, which is mapped onto the interval 0 to 1 on the number line.
- Cutting the ribbon into 4 equal parts is connected to labeling the number line in fourths.



Note: Examples are drawn from third-grade curriculum materials in Zearn Math. For more information, see <https://www.zearn.org/>.

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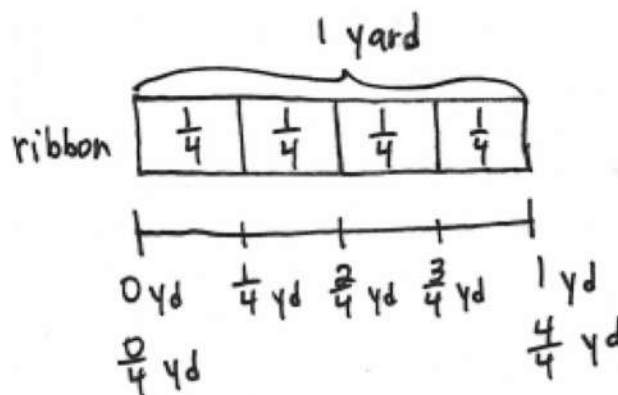


What is not clear?

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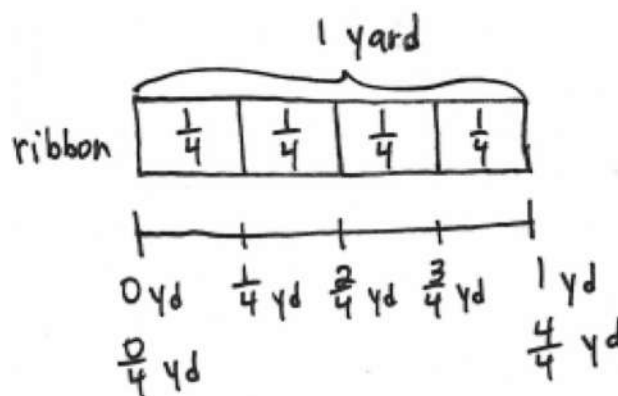
What is not clear?

On the representation of the ribbon, each part is labeled $\frac{1}{4}$ but on the number line, the tick marks are labeled $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, and $\frac{4}{4}$.

Note: Examples are drawn from third-grade curriculum materials in Zearn Math. For more information, see <https://www.zearn.org/>.

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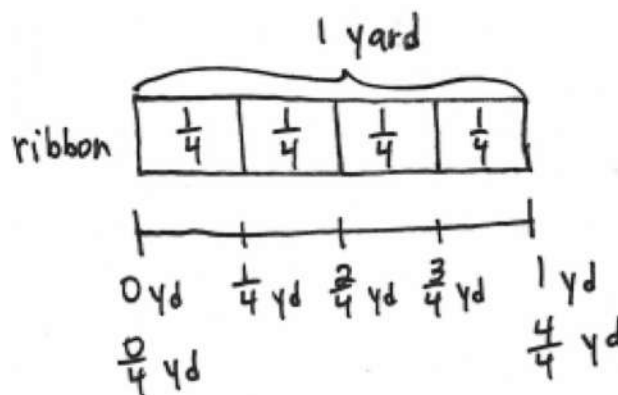
Why is that?

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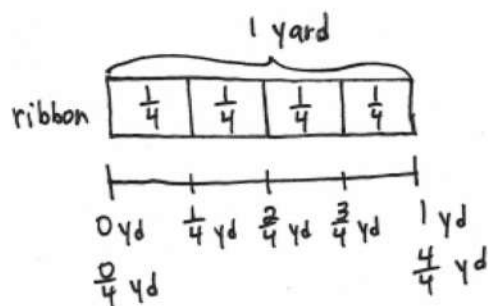
What is not clear?

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Why is that?

Because the ribbon is actually an area model and in area models, each equal part can be represented by $\frac{1}{b}$. But on the number line, the ends of each equal distance are counted from 0.

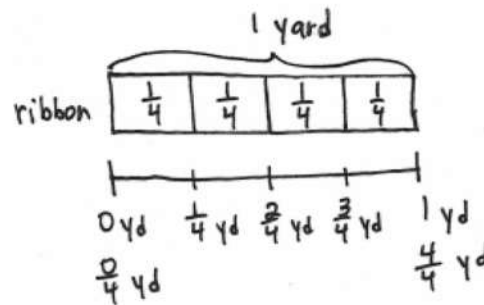
2(b). What are the main mathematical skills or practices?



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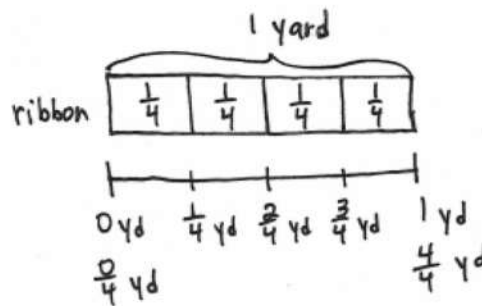
- Labeling a number line in fractions.
- Identifying one of the equal parts as $\frac{1}{b}$, the unit fraction. (3.NF.3d)
- Mapping between two representations — an area model and a number line.
- Maybe?
 - Constructing viable arguments and critiquing the reasoning of others.
 - Attending to precision.



Note: Examples are drawn from third-grade curriculum materials in Zearn Math. For more information, see <https://www.zearn.org/>.

2(b). What are the main mathematical skills or practices?

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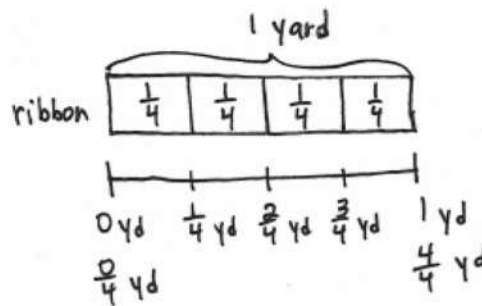


I need to practice this.

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- Maybe?
 - Constructing viable arguments and critiquing the reasoning of others.
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I need to practice this.

- I'll try to explain how the ribbon maps on to the number line.
- Is my argument viable?
- How else might someone make that argument?

Note: Examples are drawn from third-grade curriculum materials in Zearn Math. For more information, see <https://www.zearn.org/>.

1. Learning to Prepare for the Core Content, Skills, and Practices and the Alignment of the Tasks and Activities with the Learning Goals

This involves having opportunities to practice:

- a. Doing the same tasks that the children will do.
- b. Discussing the tasks.
- c. Considering how the core content, skills, and practices are aligned with the tasks.
- d. Practicing explaining, unpacking, expanding ideas and practices to connect or better address the core content, skills, and practices.

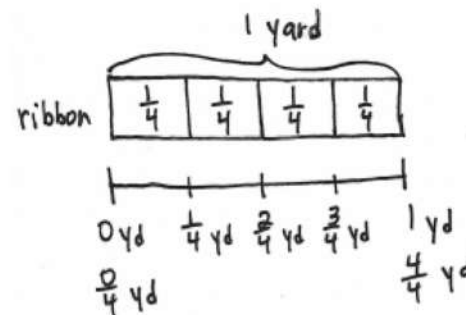
2. Learning to Coordinate an Instructional Design with Your Own Students and Context

LESSON 16

Word Problem (7 min)

Hannah bought 1 yard of ribbon to wrap 4 small presents. She wants to cut the ribbon into equal parts. Draw and label a number line from 0 yards to 1 yard to show where Hannah will cut the ribbon. Label all the fractions, including 0 fourths and 4 fourths. Also, label 0 yards and 1 yard.

 **Note:** This problem reviews the concept of placing fractions on a number line from Small Group Lessons 14 and 15.



- Anticipating what your own students might say and do
- Identifying connections to students' family and community resources
- Noticing language, tasks, or activities that could create confusion or misunderstanding
- Considering scaffolds and connections to support students
- Identifying opportunities to support students in challenging oppressive dominant narratives


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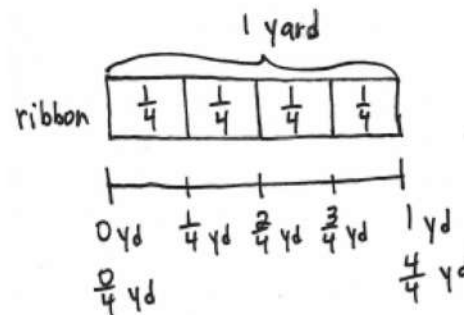
Considering Your Own Students and Context

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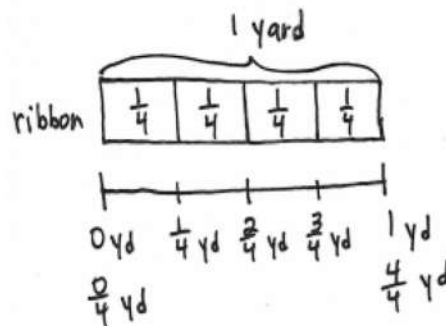
FOCUS: Notice language, tasks, or activities that might create confusion or misunderstanding.

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Considering Your Students and Context

ACCESSIBILITY AND RELEVANCE OF THE LESSON'S IDEAS, EXAMPLES, LANGUAGE

- Language: “yard”
- Mathematics: the difference between the ribbon representation and the number line
- Story context: cutting a ribbon into four equal lengths to wrap four presents
- Reasonableness and connection: Does the story make sense? Does mapping the story on to the number line make sense?
- The naming of a unit fraction $1/b$ is not explicit here?

- Anticipating what your own students might say and do
- Identifying connections to students' family and community resources
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- Considering scaffolds and connections to support students
- Identifying opportunities to support students in challenging oppressive dominant narratives

2. Learning to Coordinate an Instructional Design with Your Own Students and Context

This involves having opportunities to practice:

- a. Anticipating what your own students might say and do
- b. Identifying connections to students' family and community resources
- c. Noticing language, tasks, or activities that could create confusion or misunderstanding
- d. Considering scaffolds and connections to support students
- e. Identifying opportunities to support students in challenging oppressive dominant narratives

3. Learning to Use the Written Guidance to Develop a Complete Plan to Use for Instruction

- Plan key language to use in explaining, asking questions, labeling, etc., attending to supporting students' understanding, anticipate and avert creating misconceptions or distortions of the core content;
- Design additions or changes (additional framings, tasks, examples, exit tickets, etc.) that need to be made to scaffold learning or otherwise support learners, including additional questions or tasks that might be used if necessary, depending on how the lesson goes;
- Modify, omit, or replace contexts, examples, or other elements that reflect racial or gender bias, or other oppressive narratives, while maintaining the core content learning goals;
- Scale tasks up or down in difficulty to differentiate, reinforce, and extend instruction, being careful to maintain and support intellectual demand;
- Estimate how to distribute instructional time across the different specific parts of the lesson (e.g., whole group discussion, partner work, closing, etc.) with an eye to the main goals of the lesson and supporting one's students;
- Add details related to specific teaching moves, grouping structures, and adaptations for one's own students in a particular class;
- Create a usable form of the plan to use while teaching the lesson.

3. Learning to Use the Written Guidance to Develop a Complete Plan to Use for Instruction

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- Design additions or changes (additional framings, tasks, examples, exit tickets, etc.) that need to be made to scaffold learning or otherwise support learners, including additional questions or tasks that might be used if necessary, depending on how the lesson goes;
- Modify, omit, or replace contexts, examples, or other elements that reflect racial or gender bias, or other oppressive narratives, while maintaining the core content learning goals;
- Scale tasks up or down in difficulty to differentiate, reinforce, and extend instruction, being careful to maintain and support intellectual demand;
- Estimate how to distribute instructional time across the different specific parts of the lesson (e.g., whole group discussion, partner work, closing, etc.) with an eye to the main goals of the lesson and supporting one's students;
- Add details related to specific teaching moves, grouping structures, and adaptations for one's own students in a particular class;
- Create a usable form of the plan to use while teaching the lesson.

Design additions or changes (additional framings, tasks, examples, exit tickets, etc.) that need to be made to scaffold learning or otherwise support learners, including additional questions or tasks that might be used if necessary, depending on how the lesson goes

Scale tasks up or down in difficulty to differentiate, reinforce, and extend instruction, being careful to maintain and support intellectual demand

Option 1:

- explain “yard” and how it is different from “backyard”
- Develop the connection to the number line, since this is the mathematical point in this series of lessons

Option 3:

- Develop a student-accessible set of questions to guide the naming of fractions in $1/b$ and multiples of $1/b$ to align better with the standard.

Option 2:

- Develop a new story context that is
 - mathematically the same, but where the story context makes more sense for the number line
 - careful about language

Hannah bought 1 yard of ribbon to wrap 4 small presents. She wants to cut the ribbon into equal parts. Draw and label a number line from 0 yards to 1 yard to show where Hannah will cut the ribbon. Label all the fractions, including 0 fourths and 4 fourths. Also, label 0 yards and 1 yard.

3. Learning to Use the Written Guidance to Develop a Complete Plan to Use for Instruction

This involves having opportunities to practice:

- Planning language to use;
- Anticipating additions or changes (additional framings, tasks, examples, exit tickets, etc.) that need to be made to scaffold learning or otherwise support learners, including additional questions or tasks that might be used if necessary, depending on how the lesson goes;
- Modifying, omitting, or replacing contexts, examples, or other elements that reflect racial or gender bias, or other oppressive narratives, while maintaining the core content learning goals;
- Scaling tasks up or down in difficulty to differentiate, reinforce, and extend instruction, being careful to maintain and support intellectual demand;
- Estimating how to distribute instructional time across the different specific parts of the lesson with an eye to the main goals of the lesson and supporting one's students;
- Adding details related to specific teaching moves, grouping structures, and adaptations for one's own students in a particular class;
- Creating a usable form of the plan to use while teaching the lesson.



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Conclusion: What Does It Take to Learn to Use Instructional Materials Well in Beginning Teaching?



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Premises

1. Instructional materials can provide beginning teachers with support for teaching in ways that are coordinated to standards and sensitive to their students and contexts.
2. Instructional materials cannot do it all—know the students, recognize and draw on their contexts and communities, be sensitive to one's setting.
3. There are important things to learn in order to use (any) instructional materials with care. Left to chance, even high-quality curriculum cannot teach.
4. Teacher preparation can provide new teachers focused opportunities to learn to use instructional materials wisely.

What is Involved in Helping New Teachers Use Instructional Materials in Practice?

Structured opportunities in teacher preparation and professional development to:

1. Identify and unpack the specific content goals and to revisit and learn the content deeply enough for teaching.
2. Examine the correspondence of the tasks and activities with the content goals.
3. Consider one's own students and contexts and prepare supports or revisions to the lesson without compromising the content goals or distorting the content.
4. Develop a usable teaching plan for the lesson with one's own students in one's own classroom.
5. Build the mindset, habits, and skills to do this independently.



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Thank You!

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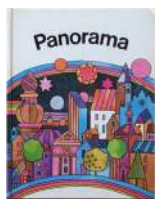


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Cover of *Panorama*, a Houghton Mifflin textbook from 1971
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Photo from “Growing beans – Science at home” on *Life at the Zoo*
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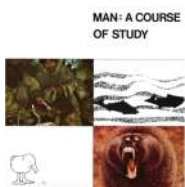


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Cover of *Man: A Course of Study*
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Graph of elementary science sequence
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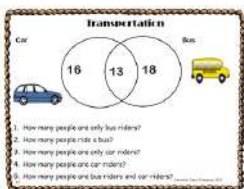


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Image from “Analyzing Venn Diagrams”

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Photo of battery circuit experiment

Retrieved <https://www.amazon.com/Beginner-Teaching-Parallel-Circuits-Batteries/dp/B00FKCVFPW>



Image on slide 4:
Photo from “Manipulatives Help Kids Understand Math Concepts” from Mathnasium

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Photo of the Marion McKinney High School Textbook Collection at the Glen Ellyn Public Library

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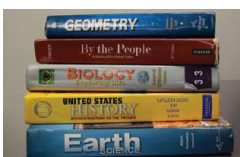


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Photo of text books from Ben Davis High School

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