Learning Progressions

Learning Progression Model

<table>
<thead>
<tr>
<th>Block of Knowledge</th>
<th>Block of Knowledge</th>
<th>Subskill</th>
<th>Curricular Aim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success Criteria</td>
<td>Success Criteria</td>
<td>Success Criteria</td>
<td>FA Checks</td>
</tr>
<tr>
<td>FA Checks</td>
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</tr>
</tbody>
</table>

(Lessons)

3 ———— 2 ———— 4 ———— 9

Learning Progression: A carefully sequenced set of building blocks consisting of subskills and bodies of enabling knowledge that, it is believed, students must master on route to mastering a more remote curricular aim.

Popham, 2008

Progressions for the Common Core State Standards in Mathematics (draft)

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20 May 2011

K. Counting and Cardinality; K-5, Operations and Algebraic Thinking

Counting and Cardinality and Operations and Algebraic Thinking are about understanding and using numbers. Counting and Cardinality address Operations and Algebraic Thinking as well as Number and Operations in Base Ten. It begins with early counting and links to operations that are familiar to the students. The concepts need to be understood, or the students may fail to master the skills.

Operations and Algebraic Thinking help students understand the patterns and relationships among the basic operations. The concepts and relations of proportional relationships are reviewed and expanded in the next grade.
Constructing a Landscape

Big Ideas

Strategies

Mathematical Models
Big Ideas, Strategies, Models

Working in your group:

• Which are you familiar with? Which does your group need to know more about?

• How might you group these or place these in a “landscape” to show the mathematical connections?

• Do any build on each other?
Activity: “Big Idea”

Step 1: Critical Content

- Identify big ideas, strategies, and models related to \((x \div \div) / (+ and -)\)
- Discuss with your face partner which critical content area(s) focus(es) on \((x \div \div) / (+ and -)\)

Packet Page 11
Activity: “Big Idea”

Step 2:

• Quickly skim and scan cluster headings and standards related to multiplication and division or addition and subtraction.

Packet Page 13
BREAK TIME
Formative Assessment Process

1. Clarify Intended Learning
2. Elicit Evidence
3. Interpret Evidence
4. Act on Evidence

Questioning/Discussion
Eliciting Evidence of Learning

We have to know where we are **before** deciding where we need to go.
In preparation for a big family gathering, I have purchased a turkey. According to my cookbook, the recommended cooking time for my turkey is 15 minutes per pound. If my turkey weighs 24 pounds, how many hours must my turkey cook?

- Considering strategies used by early 4th grade students, with your shoulder partners, what steps would you use to solve this task?
- Solve and record your 4th grade strategy on chart paper.
Task Activity – Fourth Grade

Gallery Walk:
• Please grab 3 Post-It notes from your table. As you silently walk around the room, observe the posters and leave a question or comment about the mathematics you observe.

• Please leave a comment or feedback on 3 different posters.

• Examples of feedback:
  – What were you thinking when........
  – Can you explain this pattern to me?
  – Explain to me what your thinking here......
  – Explain to me what you're thinking when.....
  – I'm having a hard time understanding this.......
Task Activity – Fourth Grade

• Send a partner to take your poster down from the wall.

• With your partner, review the comments left by other participants.

• Reflect on Mathematic Practice 3, “Construct viable arguments and critique the reasoning of others.”
Populating Your Landscape

Are there revisions you would make to your landscape?

Discuss with your table.
Model
Landscape

Standard Algorithm

Repeated Addition
Skip Counting

Partial Products
Using familiar facts

Repeated addition can be regrouped

Models multiplicative situation as repeated addition on an open number line

Unitizing

Using ten times

Clarify Intended Learning
Act on Evidence
Interpret Evidence
Elicit Evidence
Norms for Watching Teaching Videos

• Teaching is multi-faceted.
  – *The video doesn’t show everything.*

• Teaching is incredibly hard work!
  – *Assume positive intent.*

• No lesson is ever perfect.
  – *Focus on what you can use to improve your classroom instruction.*
  – Focus on the student’s and teacher’s interaction with the Mathematics.
Populating Your Landscape

Are there revisions you would make to your landscape?

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Standard Algorithm

Using ten times

Partial Products
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Repeated addition can be regrouped

Repeated Addition

Skip Counting

Unitizing

Dealing out or counting all, grouping, then counting the groups.

Tries to make equal sized groups through trial and error.

Models multiplicative situation as repeated addition on an open number line.
Balcony View

₁ Quiet Reflection: (3 min.)
Looking at your note taker, what formative assessment practices did you notice in these video clips?

₂ Discuss in your table groups.
Reviewing Task Considerations

- Does the task expose students’ current levels of understanding in relation to the mathematics learning target?

- Is it problematic for students?

- Does the cognitive demand enable students opportunities to expose the depth of their knowledge?

- Does the task have multiple entry and exit points?

- Is the context and the mathematics of the task relevant to students?

(Van de Walle et. all, p. 19, 2014)
Considerations for Landscape and Formative Assessment

 ✓ Use the mathematical landscape to drive the **formative assessment process** and clarify intended learning.

 ✓ Have students choose models from the landscape to **make learning visible** and **elicit evidence**.

 ✓ During discussions teachers are selecting models from the landscape the have students **interpret evidence** from partner work.

 ✓ The teacher is **acting on evidence** by having students repeatedly revise their partner work using mathematical models from the landscape.
LUNCH
11:30 to 12:30

• See you promptly at 12:30.
• Remember to sign in when you return.
Explore ways in which FA attributes and practices move learning forward.

- Participants will construct a progression of learning.
- Participants will discuss FA practices observed.

Context of Learning: x and ÷ + and -

How to embed formative assessment practices into daily math instruction.
Review Your Landscape

• Questions?
• Comments?
Model Landscape

Standard Algorithm

Repeated Addition

Partial Products

Using familiar facts

Repeated addition can be regrouped

Using ten times

Model multiplicative situation as repeated addition on an open number line

Unitizing

Dealing out or counting all, grouping, then counting the groups.

Tries to make equal sized groups through trial and error.
Task

• Task 1: There is a soda machine that has only one type of soda. The machine holds 156 cans of soda. How many six packs of soda would it take to fill the machine?

• Task 2: A drink machine holds 156 cans of soda. The machine has 6 columns, each containing a different type of drink. How many cans of each flavor?
Purposeful Observation

• What do you see or hear the students in the classroom doing?

• What mathematics are the students using?
Populating Your Landscape

• Add or revise your landscape to include new ideas discussed from the videos.
Model Landscape

Standard Algorithm

Repeated Addition

Partial Products

Repeated addition can be regrouped

Models with array

Using ten times

Unitizing

The relationship between partitive and quotative division

Repeated addition or subtraction in division context

Using familiar facts

Dealing out or counting all, grouping, then counting the groups.

Tries to make equal sized groups through trial and error.

Clarify Intended Learning

Act on Evidence

Elicit Evidence

Interpret Evidence

Model multiplicative situation as repeated addition on an open number line

Using familiar facts

Models with array

Repeated addition

Skip Counting
Considerations for Class Discussions

✓ Use **Talk Moves** strategies to **clarify** student thinking and emphasize reasoning.

✓ Choose work to share that drives student thinking up the **landscape**.

✓ Encourage **student to student discussion** throughout the process using partnering strategies.

✓ Create partners or groups of **similar abilities**.
Quiet Reflection: (3 min.)
Looking at your note taker, what formative assessment practices did you notice in these video clips?

Discuss in your table groups.
Considering Formative Assessment and the Landscape

- Clarify intended learning
- Elicit evidence
- Interpret evidence
- Act on evidence
Mini Lesson to reinforce Distributive Property and Multiplication by Ten

• “A” partners, you will be participating in the lesson as students. Please form a semi-circle around the chart paper at the front of the room.

• “B” partners, you will be observing the process. Please move as needed to be a quiet observer of students and teacher.
Mini Lesson to reinforce Distributive Property and Multiplication by Ten

• “B” partners, you will be participating in the lesson as students. Please form a semi-circle around the chart paper at the front of the room.

• “A” partners, you will be observing the process. Please move as needed to be a quiet observer of students and teacher.
Populating Your Landscape

• Add or revise your landscape to include new ideas discussed from the mini lessons.
Model Landscape

- **Standard Algorithm**
- **Skip Counting**
- **Repeated Addition**
- **Partial Products**
- **Commutative Property** (Relationship between rows and columns)
- **Distributive Property** (Models with array, Place value patterns that occurs when using x by 10)
- **Using familiar facts**
- **Using ten times**
- **Repeated addition can be regrouped**
- **Unitizing** (The relationship between partitive and quotative division)
- **Dealing out or counting all, grouping, then counting the groups.**
- **Tries to make equal sized groups through trial and error.**
Data Collection – Kidwatching and the landscape

NAME: **Sharon V.**

**DIVISION OF FRACTIONS**

| Uses measurement interpretation | **✓** |  |  |
| Uses partitive interpretation | **✓** |  |  |

**Set models**

|  |  | **√** | **Used two color counters to show \( \frac{1}{2} \times 3 = \)** |

**Answers that are not whole numbers**

|  |  | **✓** |

**Understand standard algorithm**

|  |  | **✓** | **Showing greater reasonableness** |

**MATHMATICIAN PRACTICES**

**Makes sense of problems and perseveres**

|  |  | **✓** | **Stated problem in own words** |

**Models with mathematics**

|  |  | **✓** | **Reluctant to use abstract models** |

**Uses appropriate tools**

|  |  | **✓** |  |
Review and Connections

Partner Conversation:
(4 min.)

1. What are the NVACS critical areas for my grade level?
2. How does the landscape support the critical areas?
3. What are some of the connections between the NVACS standards and the Mathematical landscape?
Considering the Critical Areas and the Mathematical Landscape

1. Developing understanding and fluency with multi-digit multiplication and developing understanding of dividing to find quotients involving multi-digit dividends.

2. Developing and understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers.

3. Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.
## Considering the NVACS Standards

<table>
<thead>
<tr>
<th>NVACS Standards Pg. 29 – 32</th>
<th>Language from the standards</th>
<th>Big Ideas from the landscape</th>
<th>Models to use with students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.OA.1</strong></td>
<td>*multiplicative comparison</td>
<td>Commutative property</td>
<td>*Number line *Ratio table *Open array</td>
</tr>
<tr>
<td><strong>4.OA.2</strong></td>
<td>*multiplicative comparison *unknown quantity</td>
<td>Commutative Property</td>
<td>*Number line *Ratio table *Open array</td>
</tr>
<tr>
<td><strong>4.OA.5</strong></td>
<td>*number or shape pattern</td>
<td>Commutative Property</td>
<td>*Number line *Ratio table *Open array</td>
</tr>
<tr>
<td><strong>4.NBT.1</strong></td>
<td>*ten times</td>
<td>Place value patterns that occur when multiplying by 10</td>
<td>*Number line *Ratio table *Open array</td>
</tr>
<tr>
<td><strong>4.NBT.5</strong></td>
<td>*equations, rectangular arrays, and/or area models</td>
<td>Distributive Property</td>
<td>*Number line *Ratio table *Open array</td>
</tr>
</tbody>
</table>
The Landscape’s Big Idea

- Review the standards. Where are the connections to multiplication and division.
Explore ways in which FA attributes and practices move learning forward.

Plan next steps in embedding learning into practice.

How to embed formative assessment practices into daily math instruction.

Participants will construct a progression of learning.

Participants will discuss FA practices observed.

PLCs will begin planning instruction, within today’s context, embedding formative assessment practices in plans.

Context of Learning: $x$ and $\div$, $+$ and $-$

Develop a conceptual understanding of the Formative Assessment Process and its benefits.

Compose and share a definition or quote capturing the essence of what formative assessment is.
Fall PD Opportunities

✓ District-Wide PLTs (16 hours, 1 credit)
  ✓ Continue your learning from today!
  ✓ Four follow-up sessions: 9/25, 12/4, 2/26, 5/21
  ✓ Work in grade level teams
  ✓ Content tied to “Pacing Timeline” to provide “just in time” connected learning opportunities to prepare for the next quarter of content

✓ Computational Strategies/Algorithms (8 hours, ½ credit)

✓ Core Connections: K-5 (8 hours, ½ credit) Same as offered last year. Join us if you missed it or have changed grade levels!

✓ eSuite Basic (no credit): 8/19 or 9/9

✓ Intensification Lab: During winter break

✓ Planning in Math (16 hours, 1 credit)

✓ Using Classroom Discussion to Promote Problem Solving and Solution Strategies in Mathematics

✓ Formative Assessment Webinars – (October – November)

Check Solutionwhere frequently for updates and additional opportunities!
Resources to Support

- WCSD Pacing Timeline
- WCSD Curriculum Documents
- Instructional Practice Guides

District Performance Plan Goal 1, Objective 4: The percentage of site administrators, instructional coaches, teachers, and instructional ESPs who report familiarity with WCSD Core NACS Materials and curriculum tools adopted and/or endorsed by WCSD will reach 50% by October 2014 and 75% by May 2015.
Break and Moving to Verticals
2:45-3:30 Vertical Teams with your School

Each school will turn in an exit ticket that addresses the guiding question. Individual copies of the questions have been provided for you to refer to during the discussion.

Guiding Question:
• How does the Mathematical landscape and formative assessment fit with my current teaching practices and my knowledge about nurturing and developing young mathematicians?

• **Presenters: List schools and assigned room numbers here!**
References


• Fosnot, Catherine, and Dolk, Maarten. (2001). *Young Mathematicians at Work: Constructing Multiplication and Division*. Heinemann, NH.

• Fosnot, Catherine, and Dolk, Maarten. (2001). *Young Mathematicians at Work: Constructing Addition and Subtraction*. Heinemann, NH.


