Dynamic vs. Static Assessment: A Growth Mindset Perspective
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A Growth Mindset Perspective

Cathy Fosnot, President

www.NewPerspectivesOnLearning.com
www.NewPerspectivesOnline.net
www.NewPerspectivesOnAssessment.com
Poll: What are your challenges within K-8 math?

- Engaging students
- Test Scores
- Differentiating instruction
- Personalizing learning
- Teacher willingness to change
- Informing instruction
Poll: What is your level of interest in digital curriculum?

- Just looking at the new technologies
- Researching possible software solutions for my school
- Interested in grants and funding options for my school
- Interested in viewing a demo
- Interested in pricing and a buyer’s guide
Imagine a child on the cusp of learning to walk....
Did you dissect walking into necessary pre-requisite skills, assess them, and then teach each one to mastery?
Did you use an “assess and match” approach: assess first and then plan a hands-on activity to do with a small group of “almost toddlers” so they could all discover how to walk?
Most likely we all supported development. We celebrated the moment and then found ways to challenge...to “up the ante,” right there in the moment to affect development—to support change.
We knew landmark moments of physical development. But what are the landmark moments of math development? And how do we spot the moments, celebrate, and “up the ante” for young mathematicians?
Math:
- Skills
- Concepts
- Procedures
- Formulas

The Stuff to Know
Maybe we have been teaching math history?

Stuff to know
Tapestry is that body of assumptions, beliefs, customs, and practices that we accept as foundational. They define who we are. In this time of great change, the tapestry is being torn rapidly and everywhere, and we begin to fall apart, becoming anxious and losing belief in who we are. We look backward. We become pessimistic about the present and the future because we can’t envision a new tapestry.
Data-driven Instruction

This is an opportunity to look at formative assessment differently: how, when, and what we assess can be examined.

_Do we need to assess answers and written explanations of what kids did on tests 3 times a year?_  

_Could it be continuous and actually integrated with teaching, instead of determining gaps so we can teach to them?_

_Leren: teaching and learning cannot be separated._
What do we really need to know...

• To inform how we confer?
• How we plan congresses?
• What we plan next?
You cannot step twice into the same stream. For as you are stepping in, other waters are ever flowing.
—Heraclitus

Assessment should guide teaching. It should be continuous and provide information about the “zone of proximal development” (Vygotsky 1978). To do so, it needs to foresee where and how one can anticipate that which is just coming into view in the distance (Streefland 1985). It needs to capture genuine mathematizing: children’s strategies, their ways of modeling realistic problems, and their understanding of key mathematical ideas. Bottom line, it needs to capture where the child is on the landscape of learning—where she has been, what her struggles are, and where she is going: it must be dynamic.
Formative Assessment

Dynamic:
- continuous
- in the moments
- implies change

Static:
- discrete
- one moment in time
- to describe the state, to label gaps and needs for instruction at another time
Let’s think about multiplication...

- Big Ideas
- Strategies
- Ways of modeling
24 lb. turkey at 15 minutes @ lb.

- How long to cook it?
The turkey is 24 pounds.

15 min. per pound.

1 Jump is 15 min. and 1 pound cooking.

$15 \times 24 = 360$
Scarlett and Cassandra

24 \times 15 = 415

\[ \overbrace{60 + 60 + 60 + 60 + 60}^{120} \]

\[ \overbrace{15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15 + 15}^{415} \]

We know 50 + 50 = 100 and 60 is 10 more, so 100 + 10 = 110 and we know 100 + 100 = 200 and we know 10 + 10 = 20 so it = 220 and we know 60 + 20 = 80 so it = 280 and we know 80 + 20 = 100 and we know 100 + 15 = 415
We Split 15 into 10 and 5.

10  20  30  40  50  60  70  80  90  100  110  120

6 hours and 30 min.

40 + 20 = 60

240 + 120 = 360

10 x 24 = 240
30 + 30 = 60
60 + 30 = 90
90 + 30 = 120
120 + 30 = 150
150 + 30 = 180
180 + 30 = 210
210 + 30 = 240
240 + 30 = 270
270 + 30 = 300
300 + 30 = 330
330 + 30 = 360

We know that 15 + 15 = 30 and 24 ÷ 2 = 12 so we took a shortcut and got 360.

360 min

keys
15 + 15 = 30
24 ÷ 2 = 12

30 × 12 = 360

6 hour
Marlon/Kenneth

We both counted by 15's and we counted the pounds. The answer we got was 6 hours and if you want to find what the minute is it's 360 minutes.

This is what we did:

15.1 pounds
30.2 pounds
45.3 pounds
60.4 pounds
75.5 pounds
90.6 pounds

105.7 pounds
120.8 pounds
135.9 pounds
150.10 pounds
165.11 pounds
180.12 pounds
195.13 pounds
210.14 pounds
225.15 pounds

240. pounds
255. pounds
270.18 pounds
285.19 pounds
300.20 pounds
315.21 pounds
330.22 pounds
345.23 pounds
360.24 pounds
15 \times 24 = 360

We counted by 30's so in pounds total we counted by twos. In minutes total that were we counted by 30's. In minutes per pound all there was was the number 15.

We went

\begin{align*}
MPP & = \text{Minutes per pound} \\
PT & = \text{pounds total} \\
MT & = \text{Minutes total}
\end{align*}

And if you the 3 and 0 you 6 for hours

And we 3005H 60 1 Hour figured out 3606H 120 2H how many hours 2404H
The Landscape of Learning

proportional reasoning

uses a t-chart or ratio table to represent a multiplicative situation

the distributive property of multiplication

repeated additions can be regrouped

doubling and halving

doubling

repeated addition

skip counting

represents groups and objects in the groups and counts by ones

using partial products

using five-times

the generalized use of the distributive property of multiplication (over addition and subtraction) in solving division problems

relationship between multiplication and division

unitizing

models multiplicative situation as repeated addition on an open number line

repeated addition or subtraction in division context

dealing out or counting all, grouping, then counting the groups

tries to make equal-sized groups through trial and error

the relationship between partitive and quotative division
Big Ideas
Strategies
Ways of Modeling

- Early Number Sense
- Addition and Subtraction
- Multiplication and Division
- Fractions
- Geometry and Measurement
- Proof
- Early Algebra
- Place Value
- 6 landscapes on teacher development

Heinemann Press
Getting continuous data by triangulation

- In the moment
  - analyzing children’s work
  - kidwatching as they work
- Formal items designed to capture more than answers
- From digital technology: DreamBox
2-pen assessment

4 \times 25 = 16 \times 25 =

40 \times 25 = 10 \times 100 =

27 \div 3 = 10 \times 13 =

2 \times 13 = 12 \times 13 =

3 \times 9 = 3 \times 90 =

12 \times 9 = 12 \times 12 =

6 \times 18 = 6 \times 24 =
Open-ended

- With workspace
- Children use pens
- Point is to capture the mathematizing, not a verbal explanation of it, which confounds literacy with math
The Auditorium: 9 seats in each row
1st and 2nd graders fill up 4 rows
How many kids in the audience so far?

Workspace
3rd and 4th graders fill up 5 rows
How many 3rd and 4th graders are there in the auditorium?

Workspace
The older kids fill up 9 rows
How many older kids are there?

Workspace
Digital Environments
Assessment app
- Pick up strategies, not just answers
- Follow children’s attempts on a landscape
- Provide teachers with continuous data documenting learning
- Intelligent adaptive learning
- Seamless formative assessment
- Seamless home/school connection
- Choice/personalized learning
A Sampling of DreamBox's Virtual Manipulatives

- Mathrack
- Ten Frame
- Snap Blocks
- Function Machine
- Open Number Line
**Luca W**  
Grade 5 Student

<table>
<thead>
<tr>
<th>Overview</th>
<th>Standards</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last 7 Days</td>
<td></td>
<td></td>
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</tbody>
</table>

| Progress Since September 18, 2015 | Proficiency As Of September 24, 2015 |
| Min/Week | Lessons | Growth | Grade 3 | Grade 4 | Grade 5 | Grade 6 | Grade 7 |
| 63 min | 10 | 9% | 98% | 95% | 70% | 55% | 23% |

**Wednesday, September 9, 2015**

- **Lesson In Progress**
  - Add and Subtract Integers
  - Students add and subtract positive and negative whole numbers on a number line using their own strategies.
  - [5.NBT.B.7](#)  
  - Play Demo Lesson

**Tuesday, September 8, 2015**

- **Lesson Complete**
  - Absolute Value
  - Students determine the absolute value of integers between -10 and 10 using a number line.
  - [6.NS.C.7](#)  
  - Play Demo Lesson
### Standards Proficiency

**Texas Essential Knowledge and Skills**

<table>
<thead>
<tr>
<th>All Domains</th>
<th>Number, Operation, and Quantitative Reasoning</th>
<th>Patterns, Relationships, and Algebraic Thinking</th>
<th>Geometry and Spatial Reasoning</th>
<th>Measurement</th>
<th>Probability and Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>67%</td>
<td>67%</td>
<td>60%</td>
<td>57%</td>
<td>20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

#### 5.6

67%  

The student describes relationships mathematically. The student is expected to select from and use diagrams and equations such as \( y = 5 + 3 \) to represent meaningful problem situations.

### Progress by Student

<table>
<thead>
<tr>
<th>NO PROGRESS</th>
<th>IN PROGRESS</th>
<th>COMPLETE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benjamin Coots</td>
<td>Jeremiah Lange...</td>
<td>Jane Jones</td>
</tr>
<tr>
<td>David Backes</td>
<td>James Earl</td>
<td>Kevin Devine</td>
</tr>
<tr>
<td>Esme Patterson</td>
<td>Scott Gunn</td>
<td>Grace Hopper</td>
</tr>
<tr>
<td>Henri Clay</td>
<td>Steve Ichikawa</td>
<td>Elle Kewbed</td>
</tr>
<tr>
<td></td>
<td>Lindy Swinton</td>
<td>Barry Graham</td>
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<td></td>
<td>Francis Munton</td>
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<tr>
<td></td>
<td>Mandy Lutz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lance Souppi</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clark Romero</td>
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</table>
Questions?

- Contact Information
  www.NewPerspectivesOnLearning.com
DreamBox Learning® K-8 Math
Available in English & Spanish

Rigorous Mathematics Curriculum
• Reporting Aligned to CCSS, Texas TEKS, Virginia SOL, Canada WNCP, & Canada Ontario Curriculum Reports
• Standards for Mathematical Practice

Intelligent Adaptive Learning Engine
• Millions of personalized learning paths
• Tailored to a student’s unique needs

Motivating Learning Environments
• Student Directed, Empowering
• Leverages Gaming Protocols
DreamBox Lessons & Virtual Manipulatives

Intelligently adapt & individualize to:

• Students’ own intuitive strategies
• Kinds of mistakes
• Efficiency of strategy
• Scaffolding needed
• Response time
Insight Dashboards

Colburn - 5th Grade
5th Grade
John Lincoln Middle

Despite consistent use of the tool, Bill's class is lagging behind in their understanding of fractions against the end of the school and the CCSS standards.

20,907 lessons completed this year
46% total growth this year

Standards Proficiency 5th Grade 67%

Texas Essential Knowledge and Skills

All Domains Number, Operations, and Quantitative Reasoning 67%
Patterns, Relationships, and Algebraic Thinking 60%
Geometry and Spatial Reasoning 57%
Measurement 20%
Probability and Statistics 20%

Joel de Jong Lesson Complete
Fractions & Decimals: Multi-Mixed Strategies
Students explore the commutative property (3 x 5 = 5 x 3) and apply various strategies to solve double-digit multiplication problems.

Steve McIntyre Lesson Group Complete
Fractions & Decimals: Multi-Mixed Strategies
Students explore the commutative property (3 x 5 = 5 x 3) and apply various strategies to solve double-digit multiplication problems.
Seeing is believing!

www.DreamBox.com/request-a-demo
We value your feedback, compliments, suggestions, and complaints!

Let us know how we’re doing:

https://www.surveymonkey.com/r/DH7QKJZ