EQUITY, ACCESS, and ACHIEVEMENT in the Math Classroom

Content provided by DreamBox Learning
Ensuring Equity, Access, and Empowerment in the Math Classroom for Evidence-Based Achievement

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New Perspectives on Learning, LLC

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Asst. Superintendent of Fall River, MA Public Schools
Consider a kindergarten child entering school...

Which would be more predictive of overall school success?

- Early numeracy
- Early literacy
- Social-emotional health
- Attention skills
Early numeracy was even more predictive of later success in literacy, than early literacy was!
Just what is numeracy?

300 \times 99 = ???

300 \div 12 = ???
The world our children are growing up in....

- Siri will be doing the computation, but we better have numeracy so when we hear her answer we know if it is reasonable.
- Did she hear us correctly?
Most high paying jobs of the future will require substantial mathematics

- Software engineers
- Computer engineers
- Statistics analysts
- Bankers/stock fund managers
- Space scientists
- Biomedical engineering
Numeracy is the new basic

- It’s the doorkeeper
- This is an equity, access, and empowerment issue
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.
Fall River’s Journey

1. Any theory of teaching must be based on a theory of learning. Professional development that does not connect teaching and learning, will not provide teachers with the knowledge they need to be effective.

2. If we can build teachers’ knowledge of how children learn mathematics, we can empower teachers to become instructional decision makers.

3. Teachers’ knowledge base of how children learn must be dynamic in order to support teacher moves in “real-time”, as they interact with students.
Early Implementation

School Highlight

<table>
<thead>
<tr>
<th>Letourneau Elementary (K-5)</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment</td>
<td>600</td>
</tr>
<tr>
<td>Free or Reduced Lunch</td>
<td>75%</td>
</tr>
<tr>
<td>English Language Learners</td>
<td>20%</td>
</tr>
<tr>
<td>Special Education</td>
<td>12%</td>
</tr>
</tbody>
</table>
## MCAS Release Item

| MCAS Release Item | Grade 2  
(Spring 2009) | Grade 3  
(Fall 2008) | Grade 4  
(Fall 2008) | Grade 5  
(Fall 2008) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What is 93 – 65?</td>
<td>70</td>
<td>34</td>
<td>58</td>
<td>74</td>
</tr>
<tr>
<td>A class needs 100 stars to have a pizza party. The class earned 27 stars in March and 32 stars in April. How many more stars does the class need to earn to have a pizza party?</td>
<td>49</td>
<td>32</td>
<td>55</td>
<td>79</td>
</tr>
<tr>
<td>For a sale, the price of a computer was reduced by $100 to $950. Which of the following expressions represents the price of the computer before the sale? A. 100 + 950; B. 100 – 950; C. 950 – 100 D. 950 ÷ 100</td>
<td>57</td>
<td>55</td>
<td>53</td>
<td>47</td>
</tr>
</tbody>
</table>
Addition and Subtraction Benchmark

- Items Grade 2 performed higher than Grade 3
- Items Grade 3 performed higher than grade 2
District Wide Implementation

Grade 3 Math MCAS

- Warning
- Prof or Advanced

2009: 35
2010: -25
2011: -22
2012: -31
2013: -23
2014: -22
2015: -22
2016: -21
District Wide Implementation

Grade 4 Math MCAS

- Warning
- Prof or Advanced

Year: 2009-2016

2009: -25
2010: -25
2011: -22
2012: -25
2013: -19
2014: -21
2015: 22
2016: 43
District Wide Implementation

Grade 5 Math MCAS

- 2009: -32
- 2010: -32
- 2011: -31
- 2012: -33
- 2013: -29
- 2014: 25
- 2015: -21
- 2016: -26

Legend:
- Pink: Warning
- Green: Prof or Advanced
## Current Implementation

### School Highlight
Letourneau Elementary (PreK-5)

<table>
<thead>
<tr>
<th>Letourneau Elementary (PreK-5)</th>
<th>Letourneau 2016</th>
<th>State 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment</td>
<td>600</td>
<td>950,000</td>
</tr>
<tr>
<td>Economically Disadvantaged</td>
<td>65%</td>
<td>27%</td>
</tr>
<tr>
<td>English Language Learners</td>
<td>34%</td>
<td>9%</td>
</tr>
</tbody>
</table>
Chas drew a number line to show equal fractions, as shown below.

\[\begin{array}{c}
\frac{0}{6} & \frac{1}{2} & \frac{2}{2} & \frac{3}{6} & \frac{4}{6} & \frac{6}{6} \\
\end{array}\]

Chas will write a fraction equal to \(\frac{1}{2}\) to replace the ★. Which of these fractions should he write to replace the ★?

<table>
<thead>
<tr>
<th>Grade 3 MCAS 2016</th>
<th>Letourneau</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
<td>78</td>
<td>74</td>
</tr>
<tr>
<td>Econ Disadv</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>ELLs</td>
<td>67</td>
<td></td>
</tr>
</tbody>
</table>
Equity, Access, and Empowerment for Our Academically Fragile Students

8. Nathan is using the area model below to solve a problem.

\[
\begin{array}{|c|c|}
\hline
10 \times 10 & 10 \times 6 \\
\hline
3 \times 10 & 3 \times 6 \\
\hline
\end{array}
\]

Which problem is represented by the whole area model?

A. \( 12 \times 6 \)  
B. \( 16 \times 13 \)  
C. \( 20 \times 9 \)  
D. \( 60 \times 30 \)

### Grade 4 MCAS 2016

<table>
<thead>
<tr>
<th></th>
<th>Letourneau</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Students</td>
<td>72</td>
<td>52</td>
</tr>
<tr>
<td>Econ Disadv</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>ELLs</td>
<td>59</td>
<td></td>
</tr>
</tbody>
</table>
A class of 29 students is taking a field trip to the zoo. Each ticket to the zoo costs $15.

Which of these expressions can be used to find the total cost, in dollars, of the tickets to the zoo?

A. \((29 + 10) + (29 + 5)\)
B. \((29 \times 10) + (29 \times 5)\)
C. \((29 + 10) \times (29 + 5)\)
D. \((29 \times 10) \times (29 \times 5)\)
Understanding the Development of the Mathematics Topics we teach is Critical

Landscapes of Learning
The Landscape of Learning for Multiplication

- Proportional reasoning
  - Uses a t-chart or ratio table to represent a multiplicative situation
  - 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

- The relationship between multiplication and division
  - Unitizing
    - Models multiplicative situation as repeated addition on an open number line
    - 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
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Available in English & Spanish

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What We Do: Reimagine K-8 Math for Learners and Learning Guardians

- Eliminate the wall between Instruction & Assessment
- Build Conceptual Understanding & Fluency
- Incorporate gaming protocols in 3 age-appropriate motivational frameworks to build confidence
- Use dynamic, continuous, and real-time data to create personalized learning paths
- Empower students with ownership of their own learning and teachers with powerful instructional data
- Create deeper home-to-school connections to facilitate more meaningful interactions for educators and families
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Intelligently adapt & individualize to:

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- Kinds of mistakes
- Efficiency of strategy
- Scaffolding needed
- Response time

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Dashboards for teachers, administrators, and families

- Offer insight into depth of learning so educators can see when to accelerate learning, offer remediation, and adjust their classroom instruction
- Enable educators monitor progress, identify learning gaps, and deliver differentiated assignments for every student.
- Create deeper home-to-school connections with the Family Insight Dashboard.
Nurture Teachers’ Confidence as Math Practitioners

Through comprehensive and ongoing professional development, we walk side by side with educators to align professional learning to their instructional goals, deepen math understanding, and refine instructional practice.

Customized professional learning that goes beyond product training to:

- Support successful blended learning implementations
- Increase efficacy of instructional practice
- Expand math teaching “toolkits” by helping educators to learn multiple teaching strategies.

Educators rate our professional development 4.6 out of 5 stars!
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