Using Data to Drive Personalized Math Learning Needs
USING DATA TO DRIVE PERSONALIZED MATH LEARNING NEEDS

SHARNELL JACKSON, AUTHOR
DATA-DRIVEN INNOVATIONS CONSULTING

SPONSORED BY DREAMBOX LEARNING
Webinar Topics

Building a Sustainable Data Analysis Framework

Common Challenges Involved in Establishing Data-Driven Practices

Incorporating Blended Learning Environments to Meet School Goals
How well can the teacher access and act on data to inform instructional decisions?
Where does data come from now?

How quickly can a teacher use the data to personalize instruction?
Data-Driven Decision Making Benefits

- Sharing Effective Practices
- Assessment for Learning
- Identifying Learning Gaps
- Student Goal Setting
- Stakeholder Dialogue
- Personalized Learning
Data Use Inquiry Cycle

1. Collect and prepare a variety of data about student learning
2. Interpret data and develop hypotheses about how to improve student learning
3. Modify instruction to test hypotheses and increase student learning
Schoolwide Data Use

“One of the potentially powerful resources for informing instructional and school improvement school-wide data is enormously underutilized.”

“The distinguishing characteristics of school-wide data are that they are frequently and systematically collected across a grade level or content area about an important student outcome and quickly aggregated and examined for patterns that can help inform next steps.”

Educators must have access to schoolwide mathematics data that is frequently collected and automatically aggregated to determine strengths, weaknesses, and next steps in student learning.

The data analysis inquiry process reveals patterns, trends, opportunities for students learning and school growth.
Schoolwide Data Use

The data use inquiry process must bring evidence to bear on all standards-based instructional decisions.

Educators must be empowered to use common schoolwide assessment data that is critical to accelerating mathematics achievement and growth.
Schoolwide Data Use

Educators must be able to compare multiple measures of data to verify student learning problems, needs, and effectiveness of mathematics interventions.

Educators must be able to view trend data in various dashboard graphs, matrices, aggregated, and disaggregated to inform instruction.
Online adaptive learning tools for mathematics can more efficiently identify the root cause of student learning problems, provide differentiated content and virtual manipulatives to close achievement gaps.

Effective teaching must be anchored in timely common schoolwide mathematics assessment data, content, and provide differentiated learning pathways for students.
Data Analysis Protocol

1. Focused questions
2. Interpret data and identify gaps
3. Analyze root cause for gaps
4. Rules for root cause analysis process
5. Root cause analysis process
6. Developing a testable hypotheses
7. Determine effect of instructional intervention
Multiple Measures of Data to Drive Personalized Learning Needs

- Classwork, Quizzes, Portfolios
- Benchmark Assessments
- Common Schoolwide Assessments
- Interim Assessments
- IEPs, Attendance, Behavior
- Formative Assessments
- Diagnostic Assessments

Personalizing Learning Needs
Personalizing Learning

Collect multiple forms of formative assessment data about student learning to **verify causes** that will determine the next instructional steps.

Interpret the data to **develop questions** “Ask why” about how to improve student learning problems, modify instruction to test solutions and interventions.

Align the data with personalized students’ needs to be able to **map out a course of instruction** appropriate to each students diverse needs and cognitive development.
Personalization of Student Learning

• Teachers should make specific and continually evolving plans to connect each learner with key mathematics content.

• Teachers should provide the individualized scaffolding in mathematics instruction that students will need at various points in the learning process to profoundly impact how they learn.

• Teachers should continually ask, “What does this student need at this moment in order to be able to progress with this key content, and what do I need to do to make that happen?”
Accelerating Personalized Learning

1. Collect Multiple Assessment Sources
2. Interpret Data to Improve Student Learning
3. Assign Personalized Content
4. Provide Instantaneous Feedback
5. Identify Instructional Interventions
6. Monitor Daily Progress
Online Adaptive Learning Tools Teach Students to Examine Their Own Data and Set Learning Goals

- Explain expectations and assessment criteria.
- Provide feedback that is timely, specific, and constructive.
- Help students learn from mistakes and feedback.
- Use data analyses to guide learning options.
Leadership: Establishing a Clear Vision for School-wide Data Use

**Establish** school-wide professional learning around data use.

**Define** critical teaching and learning concepts related to data use.

**Develop** action plan goals which are attainable, measurable, and relevant.

**Provide** guidance on using data to support the school’s vision and goals.
Provide supports that foster a data-driven culture

**Essential Supports**

- Designate a school-based facilitator to discuss data
- Dedicate structured time for staff collaboration
- Provide regular targeted professional development
Common Challenges

- **Lack of pedagogical data literacy**: Inability to translate into actionable instructional knowledge

- **Resistance**: Educators may find data-driven decision-making to hard and need to be convinced to expend time to make it work

- **Unprepared leadership**: Principals are many times not prepared to help in the data-driven process

- **Disconnection**: Between teachers and principals

Common Challenges

- **Time constraints**: lack of time of structured time to collaborate

- **Lack of human capacity**: around data-driven decision-making

- **A need for more instructionally valid data sources**: primarily common school-wide formative assessments that are better aligned to teaching and learning needs

Incorporating Blended Learning

Blended learning particularly models supported by online adaptive learning programs or tools enable teachers to match the right student with the right mathematics content at the right time.
Questions for Incorporating Blended Learning

How does blended learning align with current conceptions of online learning?

How does blended learning help engage students and support academic success?

How are online learning and face-to-face instruction being combined effectively?

Is blended learning meeting unique student needs that neither fully online nor face-to-face models can achieve?

What online adaptive learning tools, mathematics curricula, and professional development are being used in blended learning?
Blended Learning Models

Rotation Models:

**Station Rotation** – Students rotate among online learning, small group instruction, and paper assignments

**Lab Rotation** – Students rotate to a computer lab for the online learning station

**Flipped Classroom** – Students participate in online learning off-site, in place of traditional homework, and then attend the brick-and-mortar school for face-to-face, teacher-guided practice or projects.

**Individual Rotation** – Each student has individualized learning plan and does not necessarily rotate to each station or modality
Incorporating Blended Learning

**Flex Model** – A subject in which online learning is the backbone of student learning

**A La Carte Model** – A course that a student takes entirely online to accompany other experiences that the students is having at a brick-and-mortar school.

**Enriched Virtual Model** – A subject in which students have required face-to-face session with their teachers of record and then are free to complete their remaining coursework online with support of a teacher.
Teacher Professional Development

Of more than 1,300 studies identified as potentially addressing the effect of teacher professional development on student achievement in three content areas, nine meet the What Works Clearinghouse evidence standards, attesting to the paucity of rigorous studies that directly examine this link.

The report finds that teachers who receive substantial professional development--an average of 49 hours in nine studies--can boost their students’ achievement by about 21 percentile points.

Increasing Academic Rigor and Growth!

Provide on-site, live on-line, and self-paced on-demand professional development, intelligent adaptive learning tools to improve instruction and increase student proficiency.

Adopt a framework, process, and tools for using continuous formative assessment data to increase student motivation, persistence, and progress.
From Data Collectors to Data Innovators!

Accelerate students individual learning needs by:

- **Building the human capacity of teachers** to use formative assessments effectively by providing customized professional learning

- **Adopt a sustainable data analysis framework** to inform student-driven learning paths and increase mathematics conceptual understanding

- **Incorporate blended learning environments** to personalize learning and enable students of all abilities to enjoy learning at their own pace, path, place, and time by unlocking learning potential, accelerating achievement, and closing learning gaps
Insight Dashboards

Summer School
Springfield Elementary School

2 Lessons Completed This Year
1% Percent Growth This Year

Needs Attention
Students are averaging 30 min/week on DreamBox over the past 30 days. DreamBox recommends at least 60 min/week to see measurable progress against standards.

<table>
<thead>
<tr>
<th>Name</th>
<th>Min/Wk</th>
<th>Lessons</th>
<th>Growth</th>
<th>Grade 2</th>
<th>Grade 3</th>
<th>Grade 4</th>
<th>Grade 5</th>
<th>Grade 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanessa C</td>
<td>36 min</td>
<td>9</td>
<td>5%</td>
<td>100%</td>
<td>82%</td>
<td>43%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Aaron A</td>
<td>22 min</td>
<td>4</td>
<td>2%</td>
<td>100%</td>
<td>80%</td>
<td>42%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Salvador G</td>
<td>37 min</td>
<td>6</td>
<td>11%</td>
<td>100%</td>
<td>85%</td>
<td>47%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Cesar V</td>
<td>29 min</td>
<td>1</td>
<td>2%</td>
<td>100%</td>
<td>81%</td>
<td>42%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Jazmine S</td>
<td>18 min</td>
<td>4</td>
<td>3%</td>
<td>100%</td>
<td>94%</td>
<td>89%</td>
<td>28%</td>
<td>7%</td>
</tr>
<tr>
<td>Marbella G</td>
<td>32 min</td>
<td>7</td>
<td>9%</td>
<td>100%</td>
<td>85%</td>
<td>42%</td>
<td>8%</td>
<td>1%</td>
</tr>
<tr>
<td>Alexis P</td>
<td>36 min</td>
<td>4</td>
<td>3%</td>
<td>100%</td>
<td>80%</td>
<td>44%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Esmeralda L.</td>
<td>28 min</td>
<td>8</td>
<td>5%</td>
<td>100%</td>
<td>81%</td>
<td>44%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Ethan G</td>
<td>25 min</td>
<td>8</td>
<td>6%</td>
<td>100%</td>
<td>82%</td>
<td>44%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Julio V</td>
<td>38 min</td>
<td>6</td>
<td>10%</td>
<td>100%</td>
<td>51%</td>
<td>7%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Alicia E</td>
<td>36 min</td>
<td>4</td>
<td>4%</td>
<td>100%</td>
<td>82%</td>
<td>43%</td>
<td>5%</td>
<td>1%</td>
</tr>
<tr>
<td>Jasmine P</td>
<td>0 min</td>
<td>0</td>
<td>0%</td>
<td>100%</td>
<td>92%</td>
<td>77%</td>
<td>13%</td>
<td>1%</td>
</tr>
<tr>
<td>Logan R</td>
<td>35 min</td>
<td>2</td>
<td>8%</td>
<td>100%</td>
<td>94%</td>
<td>92%</td>
<td>29%</td>
<td>9%</td>
</tr>
<tr>
<td>Brandon H</td>
<td>32 min</td>
<td>5</td>
<td>12%</td>
<td>100%</td>
<td>86%</td>
<td>47%</td>
<td>5%</td>
<td>1%</td>
</tr>
</tbody>
</table>
Student Progress and Proficiency Reports

Colburn - 5th Grade
5th Grade
John Lincoln Middle

Despite consistent use of the tool Elle’s class is lagging behind in their understanding of fractions against the rest of the school and the CCSS standards.

20,907 Lessons completed this year
46% Total growth this year

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.
Formative, Personalized Feedback

What incorrect answers would we expect on \(29 + 62\) = ?

- 19  Student adds all four digits
- 33  Student believes this is a subtraction problem
- 81  Student does not regroup to the tens place
- 92  Arithmetic error in ones place
- 811 Student adds each column independently
- 2962 Student combines digits

- How would you “score” each error?
- How would you respond to each error?
- What lesson(s) need to come before & after?
- Which of these errors are “naturally occurring”?
Honoring Students’ Ideas
Engineered for exploration

Use the Bag-O-Matic to compute how many bags of 12 gumballs can be made from 808 gumballs.

$808 \div 12 = ?$
Engineered for realizations

Use the Bag-O-Matic to compute how many bags of 12 gumballs can be made from 808 gumballs.

\[
808 \div 12 = ?
\]

120 \div 12 = 10
Engineered for understanding

How many full bags of 12 gumballs did you pack?

Full bags: 67

120 ÷ 12 = 10
240 ÷ 12 = 20
360 ÷ 12 = 30
84 ÷ 12 = 7
Remainder: 4
808 ÷ 12 = 67 r 4

10 + 20 + 30 + 7
120 + 240 + 360 + 84

hint
THANK YOU!

Sharnell Jackson

sjackson@datadriveninnovations.com
Q & A
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

Motivating Learning Environments
• Student Directed, Empowering
• Leverages Gaming Protocols

Intelligent Adaptive Learning Engine
• Millions of personalized learning paths
• Tailored to a student’s unique needs
DreamBox Lessons & Virtual Manipulatives

Intelligently adapt & individualize to:

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

Colburn - 5th Grade
John Lincoln Middle

Despite consistent use of the tool this year, her understanding of fractions against the end of the school and the CCSS standards.

20,907 lessons completed this year
46% total growth this year
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/YVWK8J6