USING DATA TO INFORM INSTRUCTION AND PERSONALIZE LEARNING

A CONTINUOUS IMPROVEMENT FRAMEWORK

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DATA-DRIVEN INNOVATIONS CONSULTING

Sponsored by DreamBox Learning
Personalizing Learning Through Blended Tools

Establishing and Supporting Personalized Learning Using Data
21st Century Competency-Based Blended Learning

- Needs
  - Standards-Based
  - Assessment Data
  - Learning Profile

- Preferences
  - Interests & Abilities
  - Perception Data
  - Learning Options

- Technology
  - Digital Content
  - Social Networking
  - Online Learning

Personalize

Individualize

Customize
Personalizing student learning
Just introducing technology isn’t sufficient
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?
Using Data: Continuous Improvement Framework

Leadership

Technology Use

Data Coaches

Establishing a Data Culture

Data Teams
Data-Driven Decision Making

Benefits

- Data-Driven Personalized Learning Benefits
- Increases Stakeholder Dialogue
- Empowers Students to Set Learning Goals
- Identifies Effective Interventions
- Informs Instruction
- Data Driven Practices
Significant Challenges

- Demand for **personalized learning** not adequately supported by current assessments, and data use professional learning in using “assessment for learning”.

- **Blended learning and digital media** literacy importance as a key skill in every discipline and profession.

- Institutional barriers challenges moving forward in a constructive ways with **emerging technologies and BYOD**.

- K-12 must tackle the increased blending of formal and informal **competency-based online learning** with embedded assessments.

- Learning incorporating **real life experiences** is not occurring enough.

- Activities related to learning and **education take place outside the classroom** and not part of traditional learning metrics.

- Staying the course and **overcoming setbacks (grit)** not related to IQ predicts success over intelligence “Angela Duckworth Penn State”
Collect multiple forms of formative assessment data about student learning to verify causes that will determine next instructional problems and 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.
Accelerating Personalized Learning

- Collect Multiple Assessment Sources
- Interpreting Data to Improve Student Learning
- Assigning Personalized Content
- Providing Instantaneous Feedback
- Monitoring Daily Progress
- Identifying Instructional Interventions
Collect and prepare a variety of data about student learning

Interpret data and develop hypotheses about how to improve student learning

Modify instruction to test hypotheses and increase student learning
What are data?

- Pieces of information

- Data are meaningless by themselves and given meaning through the context in which they occur in instruction

- Context transforms data into information that is actionable to a decision-maker

- Educational data may be demographic, financial, personnel, annual, interim, or classroom-level
Multiple Measures of Data to Drive Personalized Learning Needs

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

Personalizing Learning Needs
“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.”

Interplay of Three Data Sources

- External Data
- School-wide Assessments
- Individual Assessments
Data Analysis Process

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
Getting to the Root Cause

Step I: Focus on the students in the bottom one-third on the most recent assessment. What is your hypothesis as to why they performed as poorly as they did?

- Hypothesis I:

- Hypothesis II:

Step II: For each hypothesis, list data to provide evidence of the hypothesis and interventions that should be made.

- Hypothesis I Evidence:

- Intervention and Timeline:

- Hypothesis II Evidence

- Intervenotional and Timeline:
Characteristics of testable hypotheses

- Identify a promising intervention or instructional modification and an effect that you expect to see.
- Ensure that the effect can be measured.
- Identify the comparison data.
## Identifying Student Learning Problems

<table>
<thead>
<tr>
<th>Levels of Data</th>
<th>Types of Data (Who? What? Based on what evidence?)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aggregated results</strong></td>
<td><strong>Sixty-five percent</strong> of all sixth grade students passed the physical science assessment.</td>
</tr>
<tr>
<td><strong>Disaggregated results</strong></td>
<td>There is a persistent achievement gap between White and Latino students in science; <strong>this year’s gap was 28%</strong></td>
</tr>
<tr>
<td><strong>Strand results</strong></td>
<td>N/A (the assessment focused on one strand area)</td>
</tr>
<tr>
<td><strong>Item results</strong></td>
<td>Students performed poorly on the <strong>10 items</strong> assessing buoyancy, with an <strong>average of 22 percent proficient</strong>; six of these items asked students to predict which objects would either float or sink.</td>
</tr>
<tr>
<td><strong>Students’ work</strong></td>
<td><strong>Showed evidence of misconceptions</strong> with the concept of buoyancy and how the composition of an object relates to its buoyancy.</td>
</tr>
</tbody>
</table>
Teach Students to Examine Their Own Data and Set Learning Goals

1. Explain expectations and assessment criteria.
2. Provide feedback that is timely, specific, well formatted, and constructive.
3. Provide tools that help students learn from feedback to increase individualization.
4. Use students’ data analyses to guide instructional changes and learning options.
Establish a Clear Vision for School-wide Assessment and Data Use

- **Establish** school-wide professional learning communities around data use to set the tone for ongoing 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.
School improvement not programs but proven practices. **The Five essential supports** are as follows:

- Visionary **instructional leadership**,  
- **Parent involvement** and community ties,  
- **Professional capacity** of the faculty in merging multiple measures of common formative assessment with instruction (and how well they work together),  
- **Student-centered** blended learning climate, and  
- **Coherent instructional inquiry** process to personalize learning.
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
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 collaborative professional development and intelligent adaptive learning tools for teachers to interpret data to inform and improve instruction.

- Adopt a systematic process and tools for using data and designate a school-based facilitator to provide ongoing professional learning, resources, and support for data analysis and interpretations.
What do we need?
Train and support educators to use data

- Recognize that professional learning and tools for data-driven decision making helps educators transform data into actionable instructional processes through research-based DATA LITERACY SKILLS AND KNOWLEDGE!

- Recognize that a continuous school-wide perspective on embedding data use into everyday instructional practices is not a one-time event.
Technologies to Support Merging Assessment with Instruction

- Technology systems
- Computing devices
- Adaptive technologies
- Digital content and media
How do you get there...

- In order to improve your academic standings, you need to create a culture that is centered around a systematic process by:

- **Developing an understanding** of the data use inquiry cycle

- **Creating a culture that is student-centered** to drive instruction

- **Facilitating blended learning environments** in which students take ownership of their own academic achievement learning through curriculum sequencing, multiple experiences, customized presentations, individualized path and pace with immediate feedback

- **Assisting teachers in adopting a systematic process for using data** in order to bring evidence to bear on their instructional decisions by using intelligent data analysis, common assessments, and competency-based modular learning pathways
Help your students to meet their individual learning needs by:

- **Building the human capacity of teachers** to use formative assessment effectively to drive instructional decisions

- **Using multiple data sources** to verify causes, identify strengths, weaknesses, interventions and inform instruction

- **Customize instruction to personalize student learning** by enabling students of all abilities to enjoy learning at their own pace, path, place, and time to unlock learning potential, accelerate achievement, and close gaps
Personalization with Technology

- Teachers have a responsibility to ensure that all of their students master important content.

- Teachers have to make specific and continually evolving plans to connect each learner with key content.

- Differences profoundly impact how students learn and the nature of scaffolding they will need at various points in the learning process.

- 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?”
Starting 1st Grade after using DreamBox in Kindergarten

### Classroom Summary Report

- **School:**
- **Class:**
- **Teachers:**
- **Date:**

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<tr>
<th>Student</th>
<th>Grade</th>
<th>Kindergarten Curriculum</th>
<th>1st Grade Curriculum</th>
<th>2nd Grade Curriculum</th>
<th>3rd Grade Curriculum</th>
<th>Time on Task (HH:MM)</th>
<th>Notifications</th>
<th>Student Reports</th>
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</table>
**Concept:** Multiplication: Double & Halve

Students use known basic facts and double one factor and halve the other to determine the product of a more challenging problem.

<table>
<thead>
<tr>
<th># Completed with Proficiency</th>
<th># In Progress</th>
<th># Not Started</th>
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</thead>
<tbody>
<tr>
<td>7 students</td>
<td>10 students</td>
<td>9 students</td>
</tr>
<tr>
<td>John P (about 1 month ago)</td>
<td>Avaneesh S (71%)</td>
<td>Anthony P</td>
</tr>
<tr>
<td>Jacob C (about 1 month ago)</td>
<td>Charles K (71%)</td>
<td>Brittany B</td>
</tr>
<tr>
<td>Rebecah D (about 1 month ago)</td>
<td>Emmanuel M (71%)</td>
<td>Christina P</td>
</tr>
<tr>
<td>Julian B (about 1 month ago)</td>
<td>Luke R (71%)</td>
<td>Emily C</td>
</tr>
<tr>
<td>Edgar H (about 1 month ago)</td>
<td>Alanna M (64%)</td>
<td>Karly H</td>
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<tr>
<td>Pedro S (2 months ago)</td>
<td>Domenic G (64%)</td>
<td>Leah P</td>
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<tr>
<td>Daniel C (3 months ago)</td>
<td>Daniel S (57%)</td>
<td>Michael D</td>
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<td></td>
<td>Dominique S (28%)</td>
<td>Samantha S</td>
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<tr>
<td></td>
<td>Suna C (28%)</td>
<td>Vanessa C</td>
</tr>
<tr>
<td></td>
<td>Caitlin S (21%)</td>
<td></td>
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</table>
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
Learning Principles

- “An understanding is a learner realization about the power of an idea.”

- “Understandings cannot be given; they have to be engineered so that learners see for themselves the power of an idea for making sense of things.”

Engineered for exploration

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

$$808 \div 12 = ?$$

pack

[Diagram showing 808 gumballs and a bag labeled 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

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

Remainder: 4
THANK YOU!

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Tim Hudson
timh@dreambox.com
Q & A
You asked for DreamBox on iPad
It’s coming in the Fall of 2013

Sign up for updates at: dreambox.com/iPad
For more information visit: [www.dreambox.com](http://www.dreambox.com)