THE POWER OF DATA AND DIGITAL RESOURCES:
Boosting Science Achievement Through Informed Instruction
THE POWER OF DATA & DIGITAL RESOURCES
Boosting Science Achievement Through Informed Instruction
OBJECTIVES

Sharing best practices in establishing an infrastructure for data-informed instruction

Describing concrete examples of digital tools that assist teacher’s in measuring student learning for formative and summative purposes
LUIS SOLANO
PANELIST

Collier County Public Schools
MARY MARSHALL
PANELIST

Collier County Public Schools
BUILDING INFRASTRUCTURE FOR ASSESSMENT FLEXIBILITY
EFFORT ACROSS THE DISTRICT

Classrooms
Emphasis on formative assessments
Data guides instruction

School-wide
PLCs working together to create common assessments

District
Pre/post tests
Quarterly benchmarks
Standardized test results
3 KEY AREAS

Organizational
QBAs
Data dialogues
Program reviews/ROIs

Technology
Robust technology network
Device usage plans
Software monitoring
iSupport platform

Professional Learning
Modeled with digital formative tools
WHERE TO START?

Drilling deeper into the classroom

Resources that support student learning

Formative assessment within the classroom

Resources to support students with summative assessments

Adding re-teaching and re-take component
UNDERSTANDING STUDENT NEEDS WITH DIGITAL RESOURCES

Formative assessment in the classroom

Action research
ACTION RESEARCH

Year One

How does the use of digital curriculum affect student achievement?
THE PROJECT

6 classes of 7th grade science students were split into two groups

- 3 classes of traditional paper and pencil
- 3 classes of digital curriculum

Every class given pretest & posttest

Weekly for 8 weeks

Traditional group given a written pretest with spoken teacher feedback

The digital group took the pretest online with feedback on device
MEASUREMENT

Weekly Pre and Post-Test
To measure weekly growth

Student attitude survey
The students using digital curriculum, Discovery Education, showed 18% higher growth on the post-test.
ACTION RESEARCH
Year Two

How will providing students with individualized digital curriculum on Discovery Education Science Techbook affect their learning and attitudes toward learning?
THE PROJECT

Before starting a unit students were given a pretest.

Based on student results, individualized digital curriculum based on their strengths and needs.

All students were given the same amount of work, with the same level of difficulty.

Assignments were created to differentiate instruction.

Final test scores were compared from this school to last year score using the same test.
MEASUREMENT

Compare class averages from 2014 to 2013

Student attitude survey
RESULTS

Providing students with an individualized digital curriculum increased class averages on the final by 5 percentage points.
TIE TO STATEWIDE TESTING

Blueprint from our state science test

Gave each school their individual data

Targeted 2-3 areas to improve

Used the DE Science TB to align those concepts

Provided individualized re-teach, review materials for each student
<table>
<thead>
<tr>
<th>Strand/Concept</th>
<th>% of Test</th>
<th># of Items</th>
<th>Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strand 1: Inquiry Process</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concept 1: Observations, Questions, and Hypotheses</td>
<td>33.3%</td>
<td>8</td>
<td>74.4</td>
</tr>
<tr>
<td>Concept 2: Scientific Testing (Investigating and Modeling)</td>
<td>11.1%</td>
<td>6</td>
<td>72.1</td>
</tr>
<tr>
<td>Concept 3: Analysis and Conclusions</td>
<td>11.1%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Concept 4: Communications</td>
<td>11.1%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Strand 2: History and Nature of Science</strong></td>
<td>11.1%</td>
<td>6</td>
<td>83.4</td>
</tr>
<tr>
<td>Concept 1: History of Science as a Human Endeavor</td>
<td>11.1%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Concept 2: Nature of Scientific Knowledge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strand 3: Science in Personal and Social Perspectives</strong></td>
<td>11.1%</td>
<td>6</td>
<td>71.8</td>
</tr>
<tr>
<td>Concept 1: Changes in Environments</td>
<td>11.1%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Concept 2: Science and Technology in Society</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strand 4: Life Science</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concept 1: Characteristics of Organisms</td>
<td>11.1%</td>
<td>6</td>
<td>76</td>
</tr>
<tr>
<td>Concept 3: Organisms and Environments</td>
<td>11.1%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Concept 4: Diversity, Adaptations, and Behavior</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strand 5: Physical Science</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concept 3: Energy and Magnetism</td>
<td>11.1%</td>
<td>6</td>
<td>67.7</td>
</tr>
<tr>
<td><strong>Strand 6: Earth and Space Science</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concept 2: Earth’s Processes and Systems</td>
<td>11.1%</td>
<td>6</td>
<td>58</td>
</tr>
<tr>
<td>Concept 3: Changes in the Earth and Sky</td>
<td></td>
<td></td>
<td>55.5</td>
</tr>
</tbody>
</table>

According to the Science Standard, the following Strands and Concepts align with the Science Content Objectives for Grade 4: Strand 4: Life Science, Concept 2 (Life Cycles); Strand 5: Physical Science, Concept 1 (Properties of Objects and Materials) and Concept 2 (Position and Motion of Objects); Strand 6: Earth and Space Science, Concept 1 (Properties of Earth Materials).
DETERMINE TARGET AREAS

Campus Processing Activity
Please examine your campus data

Determine Targeted Areas
Look for high # of questions
Look for low %’s

Share with your table
CREATE TARGETED LESSONS
Reteach
CREATE TARGETED LESSONS

Reteach

Interactions in Ecosystems

The world is home to many kinds of ecosystems. Forests and coral reefs are two examples. In this concept, you'll learn that an ecosystem includes all the living and nonliving things in an area that interact with each other.

Learning Standards

2.2.PO 1 - Describe how, in a system (e.g., terrarium, house) with many components, the components usually influence one another.

2.2.PO 2 - Explain why a system may not work if a component is defective or missing.

4.2.PO 2 - Explain how growth, death, and decay are part of the plant life cycle.

4.3.PO 4 - Describe how plants and animals cause change in their environment.
CREATE TARGETED LESSONS
Reteach

Assess
Magnets and Electricity
Check your understanding with this practice assessment.
LAUNCH

Construct Response
Magnets and Electricity
Brief Constructed Response for the concept Magnets and Electricity
Teacher's Guide
LAUNCH

Construct Response
Magnets and Electricity (Spanish Version)
Brief Constructed Response for the concept Magnets and Electricity

CREATE TARGETED LESSONS
Student View

<table>
<thead>
<tr>
<th>Due Date</th>
<th>Status</th>
<th>Assignment Name</th>
<th>Type</th>
<th>Class</th>
<th>Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/31/2015</td>
<td>Not Started</td>
<td>Pitch</td>
<td>Assessment</td>
<td>Training</td>
<td>Reinert, Barbara</td>
</tr>
<tr>
<td>02/19/2015</td>
<td>Not Started</td>
<td>Facts about Light</td>
<td>Video Segment</td>
<td>Training</td>
<td>Reinert, Barbara</td>
</tr>
<tr>
<td>03/23/2015</td>
<td>Not Started</td>
<td>Magnets and Electricity</td>
<td>Assessment</td>
<td>Training</td>
<td>Reinert, Barbara</td>
</tr>
</tbody>
</table>

---

**Diagram Overview:**
- **Welcome** section
- **Assignments** section
- **Resource Center**
- **Blog**
- **Games**
- **Get Involved**

**Assignments and Completed Sections:**
- Filters for All Types, All Classes, All Teachers
- View Assignments by List or Calendar view

**Highlighted Assignments:**
- Pitch (Assessment)
- Facts about Light (Video Segment)
- Magnets and Electricity (Assessment)
CREATE TARGETED LESSONS
Student View

Magnets and Electricity


WELCOME to the assessment: Magnets and Electricity

Number of Questions: 5

In this assessment, you will be asked 5 questions to help you better understand your knowledge of Magnets and Electricity. At the end of the assessment, you will be provided with an overall score as well as a list of recommended materials for questions that you want to spend time reviewing.

Instructions:
Check your understanding with this practice assessment.

Click the "Take Assessment" button to begin. Good Luck!
CREATE TARGETED LESSONS
Student View

Magnets and Electricity

To review your answers and recommended materials, click the "Review" button.

Assessment Results

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Correct</th>
<th>Total</th>
<th>Latest Score</th>
<th>Review Answers</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnets and Electricity</td>
<td>0</td>
<td>5</td>
<td>0%</td>
<td>Review</td>
<td>3/2/2015</td>
</tr>
</tbody>
</table>
1. How is a magnetic field created for an electromagnet?

- Incorrect: A) It has to be lined up with Earth's magnetic field.
- B) It has to be touching another magnet.
- C) Heat must be introduced.

Correct Answer: D) It must have an electrical source.

The correct answer is D. Electromagnets are produced when a metal core inside a coil receives an electric current.
CREATE TARGETED LESSONS
Student View

Recommended Materials to Review

Return to Student Center

Electricity from Magnetism
Michael Faraday proved electricity can be produced by electromagnetic induction. Now we use this knowledge to generate electricity at power plants.

Video Segment

Using a Motor to Generate Electricity: A Demonstration
A motor uses magnets to produce electricity. This segment demonstrates this concept.

Video Segment

What a Surprise
Today, scientists know that electricity can change a material that contains iron into magnet. This type of magnet is called an electromagnet.

Reading Passage

Magnetism and the Information Age
This section explains that data storage relies on magnetism, and electromagnetic waves transmit information all over the world through space.

Video Segment

Return to Review
First year: targeted 8 schools
  4 used the data as they saw fit
  4 we used the model described above

The 4 schools that did it on their own showed no growth in their AIMS schools

All schools that followed the recommendations showed growth on the AIMS test from 4% to 9%
EMPOWERING BUILDING LEADERS

Individualized by school

Presented to building leaders and then rolled out to teacher groups

Help them see their challenge areas

Aligned to digital resources
EXPECTATIONS FOR EDUCATORS

Standards-based instruction
Available to all students
Core benchmark assessment designed by the district
Maximizing digital resources
AN ENVIRONMENT OF COLLABORATION

Teachers co-plan with lessons and create common grade level assessments

Grade level teachers analyze data during PLC times

Administrator support
UNDERSTANDING WHAT’S HAPPENING IN CLASSROOMS

Software usage monitoring

Teacher evaluation

ALL students monitored for understand or misunderstanding
FLEXIBILITY IN ASSESSMENTS

Teacher created resources

Techbook assets and other digital options

Collier’s data warehouse

Regular analytics across organizations

Correlation between assets and use, passing statewide tests
DIGITAL RESOURCES FOR TEACHING & LEARNING

**Students**
Just in time adjustment to instruction

**Teachers**
Modeled throughout meetings

Video taped lessons with reflections uploads to YouTube channel
REALITIES OF CLASSROOM ASSESSMENT

Give instant feedback to students

Help uncover misconceptions

Provide opportunities for remediation
DIGITAL IN ACTION

Plickers

Kahoot

Padlet

Board Builder

Discovery Education’s SOS strategies

Teacher dashboard

Techbook Technology enhanced items
DIGITAL IN ACTION
DIGITAL IN ACTION
ASSESSMENT IN ACTION
DIGITAL IN ACTION
It is a warm spring day. Your family has planned a picnic at a local park. Before you can finish packing up the car, a thunderstorm moves in. You have to change your plans and have an indoor picnic. What is a thunderstorm and how does one form?

A thunderstorm occurs when there is lightning in a rain cloud. Lightning can kill you but it can never strike in the same place twice. Thunder is the sound of lightning.
## Student Learning Dashboard

**Unit 1: Severe Weather | Concept 1: Thunderstorms**

### Explain

<table>
<thead>
<tr>
<th>Students</th>
<th>Constructed Response: Thunderstorms</th>
<th>Thunderstorms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bohr. Neilsen</td>
<td>![Score Icon] (Needs Score)</td>
<td>![Score Icon] (Needs Score)</td>
</tr>
</tbody>
</table>

### Evaluate

- **Total Points Possible**: 6
- **Legend**:
  - Red: No Points
  - Yellow: Some Points
  - Green: All Points
  - White: Not Answered

[Discovery Education Techbook Logo]
A thunderstorm occurs when there is lightning in a rain cloud. Lightning can kill you but it can never strike in the same place twice. Thunder is the sound of lightning.

Lightning is a giant electrical spark. During a thunderstorm, there are three ways that lightning during can travel. Describe the three ways using words, drawings, or both. Label your drawings to show the direction in which the lightning is moving.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Response 1</td>
<td>Response includes a definition of a thunderstorm that includes heavy wind, rain, and lightning. Response also explains how thunderstorms form including that warm air moves upward within the cloud and the water vapor within the air condenses.</td>
<td>Response includes a complete definition of a thunderstorm and a partial explanation of how one forms or an incomplete definition of a thunderstorm and a complete definition of how one forms.</td>
<td>Response includes either a complete definition of a thunderstorm or 1 thing necessary for a thunderstorm to form, such as warm, moist air.</td>
<td>No response, or response not appropriate to the question.</td>
<td>1</td>
</tr>
</tbody>
</table>
## Student Learning Dashboard

**Unit 1: Severe Weather | Concept 1: Thunderstorms**

### Explain vs. Evaluate

<table>
<thead>
<tr>
<th>Students</th>
<th>Constructed Response: Thunderstorms</th>
<th>Thunderstorms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Points Possible</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Bohr, Nielsen</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Legend:**
- **No Points**
- **Some Points**
- **All Points**
- **Not Answered**
- **Needs Score**

**Discovery Education | Science Techbook**
Is It a Single-Celled or Multicellular Organism?

Place each organism in the correct category.

Single-Celled Organisms  Multicellular Organisms

amoeba
paramecium
grass
ant
dog
bacterium
<table>
<thead>
<tr>
<th>Single-Celled Organisms</th>
<th>Multicellular Organisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>paramecium</td>
<td>amoeba</td>
</tr>
<tr>
<td>grass</td>
<td>ant</td>
</tr>
<tr>
<td>bacterium</td>
<td>dog</td>
</tr>
</tbody>
</table>

Is It a Single-Celled or Multicellular Organism?

Place each organism in the correct category.
Is It a Single-Celled or Multicellular Organism?

Place each organism in the correct category.

Single-Celled Organisms
- paramecium
- grass
- bacterium

Multicellular Organisms
- amoeba
- ant
- dog

Incorrect Answer  Correct Answer

You have some important knowledge about this topic. You will have the chance to improve upon your ideas as you complete this lesson.
Is it a Single-Celled or Multicellular Organism?

Place each organism in the correct category.

Single-Celled Organisms
- amoeba ✓
- paramecium ✓
- bacterium ✓

Multicellular Organisms
- grass ✓
- ant ✓
- dog ✓

Incorrect Answer    Correct Answer

You have some important knowledge about this topic. You will have the chance to improve upon your ideas as you complete this lesson.
WHAT IS THE ROLE OF THE STUDENT?

Include students and understand how they like to learn.

If students are engaged and take ownership of their learning, results of student achievement will improve.

Our kids are digital learners… this is how they want to learn!!!
WHAT DID STUDENTS SAY

Do you prefer using digital curriculum or having your teacher give you the information?

STUDENT RESPONSES

Digital: 81
Teacher: 19

Percentage of Student Responses
WHAT DID STUDENTS SAY

Do you think teachers should use more or less digital curriculum?

STUDENT RESPONSES

Percentage of Student Responses

- More: 77%
- Less: 2%
- Just Right: 21%
WHAT DOES DIGITAL CURRICULUM LOOK LIKE IN THE CLASSROOM

<table>
<thead>
<tr>
<th>TEACHERS</th>
<th>STUDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-media presentations</td>
<td>Looking up information on Internet</td>
</tr>
<tr>
<td>On-line tests</td>
<td>Accessing class information (Grades, assignments, etc.)</td>
</tr>
<tr>
<td>Re-teaching and Re-takes</td>
<td>Collaborating with peers (classroom peers and peers around the world)</td>
</tr>
<tr>
<td>On-line texts/other resources</td>
<td>Record lectures or labs</td>
</tr>
<tr>
<td>Teacher videos – lectures (Flip)</td>
<td>Review materials for self-remediation</td>
</tr>
<tr>
<td>Virtual experiments/simulations</td>
<td>Texting teacher during class to ask questions for timely feedback</td>
</tr>
<tr>
<td>Mediating classroom discussions</td>
<td>Discussion Forums</td>
</tr>
<tr>
<td></td>
<td>Projects</td>
</tr>
</tbody>
</table>
Q & A
REFLECTIONS

Using digital resources to engage students and drive engagement

Best practices in establishing an infrastructure for data-informed instruction

Concrete examples of digital tools measuring student learning for formative and summative assessment
FREE 60-DAY TRIAL

discoveryeducation.com/trials
THANK YOU

BARB REINERT  LUIS SOLANO  MARY MARSHALL

On Demand Archive
Available in 24 hours
edweek.org
FREE 60-DAY TRIAL

discoveryeducation.com/trials