Connecting Literacy and Science with NGSS and Common Core

Breakout B: Connecting Literacy and Science in Elementary School

Presented by: Kim Stilwell

August 6, 2014
1:10 p.m. ET / 12:10 p.m. CT / 11:10 a.m. MT / 10:10 a.m. PT
Introducing today’s presenter...

Kim Stilwell
Blue Springs R-IV School District
Building a Foundation through Children’s Literature

Kim Stilwell
Where are you joining us from?
Mythbusters Video

http://vimeo.com/101889180
What is your role in education?

<table>
<thead>
<tr>
<th>Role</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom teacher</td>
<td></td>
</tr>
<tr>
<td>Specialist/coach</td>
<td></td>
</tr>
<tr>
<td>Curriculum developer</td>
<td></td>
</tr>
<tr>
<td>District/state leader</td>
<td></td>
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<tr>
<td>Informal educator</td>
<td></td>
</tr>
<tr>
<td>PD provider</td>
<td></td>
</tr>
<tr>
<td>Other (share in chat)</td>
<td></td>
</tr>
<tr>
<td>Grade/Role</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---</td>
</tr>
<tr>
<td>Preschool/K</td>
<td></td>
</tr>
<tr>
<td>1st</td>
<td></td>
</tr>
<tr>
<td>2nd</td>
<td></td>
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<tr>
<td>3rd</td>
<td></td>
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<tr>
<td>4th</td>
<td></td>
</tr>
<tr>
<td>5th</td>
<td></td>
</tr>
<tr>
<td>Informal</td>
<td></td>
</tr>
<tr>
<td>Other grade/role</td>
<td></td>
</tr>
</tbody>
</table>

(share in chat)
How long have you been teaching?

A. This is my first year
B. 1 – 3 years
C. 4 – 9 years
D. 10+ years
E. Other (share in chat)
Goals for this Session

- Share our success story with *connecting Picture Perfect Science Lessons* with fiction and non-fiction children’s literature

- Share how PPS and picture books can be used to help connect Common Core ELA Standards and NGSS?
How familiar are you with Picture-Perfect Science?

Place an “x or stamp” on the chart to represent your familiarity.

0 1 2 3 4
Never heard of it Could teach a class about it
Professional Development Activities

Summer Institute
(80 hours each year)

Follow-Up Sessions
(6 follow up days each year)

Job Embedded Coaching

Instructional Vignettes
Background Data
Survey of teacher knowledge and skills

• Average of 3.4 hours of science content graduate hours.

• Last class taken an average of more than 9.5 years ago.

• Average of 8 hours of PD hours with science focus the last three years.

• Teachers indicated that they were only somewhat prepared to teach the science standards.

• Analyze data from student performance on standardized state test (MAP).
Baseline Findings

Inquiry Continuum Familiarity

- Never Heard About Topic
- Some Understanding About Topic
- Could Teach Students About Topic
- Could Teach Students & Teachers About Topic
- Could Teach Students & Conduct Workshop About Topic

Number of Participants

Before Instruction
After Instruction
Baseline Findings

Reading Strategies Familiarity
Outlined in Strategies That Work (Harvey and Goudvis)

<table>
<thead>
<tr>
<th>Number of Participants</th>
<th>Never Heard of the Six Reading Strategies to Could Teach a Class on the Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>[Before Instruction]</td>
</tr>
<tr>
<td>1</td>
<td>[Before Instruction]</td>
</tr>
<tr>
<td>2</td>
<td>[Before Instruction]</td>
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<td>3</td>
<td>[Before Instruction]</td>
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<td>13</td>
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<td>14</td>
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<tr>
<td>15</td>
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<tr>
<td>16</td>
<td>[After Instruction]</td>
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<td>17</td>
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<td>18</td>
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<td>19</td>
<td>[After Instruction]</td>
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<td>20</td>
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</tr>
<tr>
<td>28</td>
<td>[After Instruction]</td>
</tr>
<tr>
<td>29</td>
<td>[After Instruction]</td>
</tr>
<tr>
<td>30</td>
<td>[After Instruction]</td>
</tr>
</tbody>
</table>
Baseline Findings

![Chart showing 5E Instructional Model Familiarity]

- Number of Participants
- Categories: Never Heard About Topic, Some Understanding About Topic, Could Teach Students About Topic, Could Teach Students & Teachers About Topic, Could Teach Students & Conduct Workshop About Topic
- Graph comparison between Before Instruction and After Instruction
Professional Development Activities
Elementary Learners

- Naturally curious
- Active learners
- Transition from learning to read to reading to learn
- Capable of learning science concepts as young as preschool
- Increasingly able to reason and understand more complex steps
- Becoming less egocentric and more independent
3 Main Components of PPS

1. Inquiry-Based Science
2. BSCS 5E Instructional Model
3. Reading Comprehension Strategies
   - Making Connections
   - Questioning
   - Visualizing
   - Inferring
   - Determining Importance
   - Synthesizing
How familiar are you with the Common Core State Standards for English Language Arts?

Place an “x or stamp” on the chart to represent your familiarity.

0  Never heard of it
1  
2  
3  
4  Could teach a class about it
By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4–5 text complexity band independently and proficiently.
Connecting to the Standards

A Framework for K–12 Science Education
and the Common Core State Standards for English Language Arts

In this book the science and language arts standards that are addressed in the activities for each lesson are clearly identified. On the first page of each chapter, you will find a box titled, “Lesson Objectives Connecting to the Framework,” which lists the disciplinary core and component ideas from *A Framework for K–12 Science Education* (NRC 2012) as well as specific grade-level endpoints that the lesson addresses. Throughout the lessons you will find boxes noting the Common Core State Standards for English Language Arts (ELA) that are used during read-alouds and writing assignments. This chapter provides some background information about the Framework and the Common Core State Standards for ELA and how our lessons connect to them.

*A Framework for K–12 Science Education*

*A Framework for K–12 Science Education* was published by the National Research Council in 2012 and is the first step in a process to create new standards for K–12 science education. The overarching goal of the committee doing this work was “to ensure that by the end of 12th grade, all students have some appreciation of the beauty and wonder of science; possess sufficient knowledge of science and engineering to engage in public discussions on related issues; are careful consumers of scientific and technological information related to their everyday lives; are able to continue to learn about science outside school; and have the skills to enter careers of their choice, including (but not limited to) careers in science, engineering, and technology” (NRC 2012, p. 1).

The committee recommended that K–12 science be developed around three major dimensions: (1) scientific and engineering practices, (2) crosscutting concepts, and (3) disciplinary core ideas.

**Dimension 1: Scientific and Engineering Practices**

This dimension describes eight fundamental practices that scientists use as they investigate and build models and theories about the world, as well as the engineering practices that engineers use as they design and build systems (NRC 2012, p. 42).

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

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Reference: *A Framework for K–12 Science Education* (NRC 2012)
Common Core Connections in EMPPS

Figure 5.1. Sample Common Core Box

Connecting to the Common Core

Reading: Literature

Key Ideas and Details: K.1, 1.1, 2.1

Strand Grade Levels Standard Numbers
Questioning

Connecting to the Common Core
Reading: Informational Text
Key Ideas and Details: 3.1, 4.1, 5.1

Fossils Tell of Long Ago
Read-Aloud

Connecting to the Common Core
Reading: Informational Text
Integration of Knowledge and Ideas: 3.9, 4.9, 5.9
Key Ideas and Details: 3.3, 4.3, 5.3

engage

The Boy Who Harnessed the Wind Read-Aloud

Connecting to the Common Core
Reading: Literature
Key Ideas and Details: 3.1, 4.1, 5.1

Inferring

Show students the cover of *The Boy Who Harnessed the Wind* and ask

? From looking at the cover art and the title, what do you think this book might be about?

Then read the synopsis on the back cover, “The true story of a boy whose great idea and perseverance lit up his home and inspired the world.” Ask

? What does it mean to persevere? (to keep going in spite of difficulties)

Read the first page and then have students locate Malawi on a map of Africa.
Picture-Perfect Science Lessons: Using Children’s Books to Guide Inquiry, Grades 3-6

This book of 20 ready-to-teach lessons for upper elementary students features engaging, science-related picture books that are tied to inquiry-based science lessons. Lessons are organized using the 5Es Instructional Model and reading strategies are embedded throughout.

Lessons
- Earthquakes
- Name That Shell
- Rice is Life
- What’s Poppin’?
- Mystery Pellets
- Close Encounters of the Symbiotic Kind
- Turtle Hurdles
- Oil Spill
- Sheep in a Jeep
- Sounds of Science

- Chemical Change Café
- The Changing Moon
- Day and Night
- Grand Canyon
- Brainstorms: From Idea to Invention
- Bugs!
- Batteries Included
- The Secrets of Flight
- Down the Drain
- If I Built a Car

Correlations
- Next Generation Science Standards
  - Picture-Perfect Science NGSS Correlations
  - More Picture-Perfect Science NGSS Correlations
  - Even More Picture-Perfect Science NGSS Correlations

ELA Common Core
- Picture-Perfect Science and Common Core
- More Picture-Perfect Science and Common Core

For Ohio Educators
- Picture-Perfect Science and Ohio’s New Standards for K-5 Science
- More Picture-Perfect Science and Ohio’s New Standards for K-5 Science
How familiar are you with the Next Generation Science Standards?

Place an “x or stamp” on the chart to represent your familiarity.

0 1 2 3 4
Never heard of it Could teach a class about it
3 Dimensions of NGSS

- Disciplinary Core Ideas
- Crosscutting Concepts
- Science and Engineering Practices

Lesson objectives are the grade band endpoints of the *Framework for K-12 Science Education*. 
## Correlations to the NGSS

<table>
<thead>
<tr>
<th>Chapter Number and Lesson</th>
<th>Grades</th>
<th>Discipline</th>
<th>Disciplinary Core Ideas</th>
<th>Crosscutting Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 10, Sounds All Around</td>
<td>1</td>
<td>Physical Science</td>
<td>PS4.A Wave Properties</td>
<td>Cause and Effect</td>
</tr>
<tr>
<td>Chapter 12, Seeds on the Move</td>
<td>2</td>
<td>Life Science</td>
<td>LS2.A Interdependent Relationships in Ecosystems</td>
<td>Cause and Effect</td>
</tr>
<tr>
<td>Chapter 13, Unbeatable Beaks</td>
<td>1</td>
<td>Life Science</td>
<td>LS1.A Structure and Function</td>
<td>Structure and Function</td>
</tr>
<tr>
<td>Chapter 14, Ducks Don’t Get Wet</td>
<td>4</td>
<td>Life Science</td>
<td>LS1.A Structure and Function</td>
<td>Structure and Function</td>
</tr>
<tr>
<td>Chapter 15, Amazing Caterpillars</td>
<td>1, 3</td>
<td>Life Science</td>
<td>LS1.B Growth and Development of Organisms</td>
<td>Patterns</td>
</tr>
</tbody>
</table>
# English Language Arts Common Core Alignment

## ELA Common Core Standards

### Grade 3:
- **RL.3.1.** Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
- **RL.3.2.** Recount stories, including fables, folktales, and myths from diverse cultures; determine the central message, lesson, or moral and explain how it is conveyed through key details in the text.
- **SL.3.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on **grade 3 topics and texts**, building on others' ideas and expressing their own clearly.
  - a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
  - b. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion).
  - c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others.
  - d. Explain their own ideas and understanding in light of the discussion.
- **SL.3.2.** Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- **W.3.10.** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
- **L.3.6.** Acquire and use accurately grade-appropriate conversational, general academic, and domain-specific words and phrases, including those that signal spatial and temporal relationships (e.g., *After dinner that night we went looking for them*).

### Grade 4:
- **RL.4.1.** Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.
- **RL.4.2.** Determine a theme of a story, drama, or poem from details in the text; summarize the text.
- **SL.4.1.** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on **grade 4 topics and texts**, building on others' ideas and expressing their own clearly.
  - a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.
  - b. Follow agreed-upon rules for discussions and carry out assigned roles.
  - c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.
  - d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
- **W.4.10.** Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
Freezing and Melting

Description
Frozen treats provide a familiar and fun context for learning about changes in matter. Through engaging read-alouds and some cool activities (pun intended) with Popsicles and ice cream, students learn about solids, liquids, freezing, and melting.

Suggested Grade Levels: K–2

LESSON OBJECTIVES Connecting to the Framework

PHYSICAL SCIENCES
Core Idea PS1: Matter and Its Interactions
By the end of grade 2: Different kinds of matter exist (e.g., wood, metal, water), and many of them can be either solid or liquid, depending on temperature.

PS1.B: Chemical Reactions
By the end of grade 2: Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible (e.g., melting and freezing), and sometimes they are not (e.g., baking a cake, burning fuel).
NGSS, Grade 1 DCIs

Disciplinary Core Ideas

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)
- Different properties are suited to different purposes. (2-PS1-2),(2-PS1-3)
- A great variety of objects can be built up from a small set of pieces. (2-PS1-3)

PS1.B: Chemical Reactions
- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)
Why read picture books in science class?

• Lack of time – integration is key
### Table 2. Changes Since 2001-02 in Instructional Time for Elementary School English Language Arts and Math in Districts Reporting Increases

*Of those districts reporting an increase in instructional time...*

<table>
<thead>
<tr>
<th>Subject</th>
<th>Average Total Instructional Time Pre-NCLB (Minutes per Week)</th>
<th>Average Total Instructional Time Post-NCLB (Minutes per Week)</th>
<th>Average Increase (Minutes per Week)</th>
<th>Average Increase as a Percentage of Total Instructional Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>English language arts</td>
<td>378</td>
<td>520</td>
<td>141</td>
<td>47%</td>
</tr>
<tr>
<td>Mathematics</td>
<td>264</td>
<td>352</td>
<td>89</td>
<td>37%</td>
</tr>
<tr>
<td>Either/both subject(s)</td>
<td>513</td>
<td>699</td>
<td>186</td>
<td>43%</td>
</tr>
</tbody>
</table>
Table 3. Changes Since 2001-02 in Instructional Time for Various Elementary School Subjects in Districts Reporting Decreases

Of those districts reporting an increase in instructional time for ELA and/or math AND a decrease in instructional time for one or more of the subjects listed . . .

<table>
<thead>
<tr>
<th>Subject or Period</th>
<th>Average Total Instructional Time Pre-NCLB (Minutes per Week)</th>
<th>Average Total Instructional Time Post-NCLB (Minutes per Week)</th>
<th>Average Decrease (Minutes per Week)</th>
<th>Average Decrease as a Percentage of Total Instructional Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social studies</td>
<td>239</td>
<td>164</td>
<td>76</td>
<td>32%</td>
</tr>
<tr>
<td>Science</td>
<td>226</td>
<td>152</td>
<td>75</td>
<td>33%</td>
</tr>
<tr>
<td>Art and music</td>
<td>154</td>
<td>100</td>
<td>57</td>
<td>35%</td>
</tr>
<tr>
<td>Physical education</td>
<td>115</td>
<td>75</td>
<td>40</td>
<td>35%</td>
</tr>
<tr>
<td>Recess</td>
<td>184</td>
<td>144</td>
<td>50</td>
<td>28%</td>
</tr>
<tr>
<td>Lunch</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>One or more subjects listed</td>
<td>461</td>
<td>318</td>
<td>145</td>
<td>32%</td>
</tr>
</tbody>
</table>
How many minutes of science instruction do your students have each week?

Share in the Chat Window
Why read picture books in science class?

Engaging on Emotional Level

Engaging on Intellectual Level

Engaging to students of all ages
Why read picture books in science class?

- **Context For Concepts**
- Example: Describe how day and night are caused by earth’s rotation
Cautions

- Storyline may distract – stay focused on your purpose for reading
- Be aware of “watered-down” science content
Moving

These zebras are **galloping**. Living things can move by themselves. Most animals use their legs, wings, or **fins** to move.
Cautions

• Be aware of inaccuracies
The sapling took food from the wet soil. It soaked up every drop of light its tiny leaves could reach, and grew a little more each day.
Suggestions

Pair Fiction with Nonfiction

DIARY OF A WORM
By Doreen Cronin • Pictures by Harry Bliss
FROM THE AUTHOR OF CLICK, CLACK, MOO: COWS THAT TYPE

Wiggling Worms at Work
by Wendy Pfeffer • illustrated by Steve Jenkins
Come On, Rain!

By Karen Hesse  Pictures by Jon J Muth

What Will the Weather Be?

By Lynda DeWitt  Illustrated by Carolyn Croll
### Percentage of Nonfiction Text Recommended for Common Core Instruction

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 4</td>
<td>50%</td>
</tr>
<tr>
<td>Grade 8</td>
<td>55%</td>
</tr>
<tr>
<td>Grade 12</td>
<td>70%</td>
</tr>
</tbody>
</table>
Use Read-Aloud/Think-Aloud to Learn Science

- Read author/illustrator/copyright date – any discoveries since then?
- Read/Stop – Use sticky notes
- Reread – A good reader does this
- Put in own words
- Refer to prior knowledge (eggshells vs. earth shell)
- Connections to previous topics and/or readings
- Look at this illustration
- Act it out
- Introduce book, then vocabulary
- Follow-up discussion
Question break

• What questions do you have?
• What are your thoughts about what we’ve covered so far?
Picture Perfect Science Lesson Plan

Imaginative Inventions

Description
Learners explore the invention process by learning about inventions throughout history and how inventions fill needs or wants, by improving existing inventions, and by keeping a toy invention journal. They further their understandings of the risks and benefits of inventions by testing toys and comparing the fun testing and the safety testing of each toy.

Suggested Grade Levels: 2–4

Lesson Objectives Connecting to the Standards
Content Standard E: Science and Technology Abilities of Technological Design
- Identify a simple problem, and identify a specific task and solution related to the problem.
- Propose a solution to make something work better.
- Evaluate a product or design made by themselves or others.
Content Standard E: Science and Technology Understanding About Science and Technology
- Understand that people have always had problems and invented tools and techniques to solve problems.
- Understand that trying to determine the effects of solutions helps people avoid some new problems.

Featured Picture Books

<table>
<thead>
<tr>
<th>Title</th>
<th>Author</th>
<th>Illustrator</th>
<th>Publisher</th>
<th>Year</th>
<th>Genre</th>
<th>Dual Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leo Cockroach, Toy Tester</td>
<td>Kevin O’Malley</td>
<td>Kevin O’Malley</td>
<td>Walker</td>
<td>1999</td>
<td>Story</td>
<td>Leo Cockroach, who secretly tests toys for the bug-hating president of a toy company, seeks a job with the competitor across the street and finds himself worse off than before.</td>
</tr>
</tbody>
</table>
### NGSS Correlation

<table>
<thead>
<tr>
<th>Chapter Number and Lesson</th>
<th>Grades</th>
<th>Discipline</th>
<th>Disciplinary Core Ideas</th>
<th>Crosscutting Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 15, Mirror, Mirror</td>
<td>1</td>
<td>Physical Science</td>
<td>PS4.B Electromagnetic Radiation</td>
<td>Cause and Effect</td>
</tr>
<tr>
<td>Chapter 16, If You Find a Rock</td>
<td>4</td>
<td>Earth and Space Sciences</td>
<td>ESS2.A Earth Materials and Systems</td>
<td>Structure and Function</td>
</tr>
<tr>
<td>Chapter 17, Sunshine on My Shoulders</td>
<td>K</td>
<td>Earth and Space Sciences</td>
<td>PS3.B Conservation of Energy and Energy Transfer</td>
<td>Cause and Effect</td>
</tr>
<tr>
<td>Chapter 18, Stargazers</td>
<td>1, 5</td>
<td>Earth and Space Sciences</td>
<td>ESS1.A The Universe and Its Stars/ ESS1.B Earth and the Solar System</td>
<td>Patterns</td>
</tr>
<tr>
<td>Chapter 20, A Sense of Wonder</td>
<td>2, 3</td>
<td>Life Science</td>
<td>LS4.D Biodiversity and Humans</td>
<td>Influence of Engineering, Technology, and Science on Society and the Natural World**</td>
</tr>
</tbody>
</table>

* Denotes a Science and Engineering Practice
**Denotes a Connection to Engineering, Technology and Applications of Science
## More Picture-Perfect Science Lessons

### English Language Arts Common Core Alignment

<table>
<thead>
<tr>
<th>Lesson Title</th>
<th>Suggested Grade Level</th>
<th>ELA Common Core Standards</th>
</tr>
</thead>
</table>
| Imaginative        | 2-4                   | **Grade 2:**  
| Inventions         |                       | - RL.2.1. Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.  
|                    |                       | - RL.2.1. Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.  
|                    |                       | - RI.2.2. Identify the main topic of a multi-paragraph text as well as the focus of specific paragraphs within the text.  
|                    |                       | - W.2.7. Participate in research and writing projects (e.g., a number of books on a single topic to produce a report; record science observations).  
|                    |                       | - W.2.8. Recall information from experiences or gather information from provided sources to answer a question.  
|                    |                       | - SL.2.1. Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups.  
|                    |                       | - SL.2.2. Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.  
|                    |                       | **Grade 3:**  
|                    |                       | - RL.3.1. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.  
|                    |                       | - RL.3.1. Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.  
|                    |                       | - RI.3.2. Determine the main idea of a text; recount the key details and explain how they support the main idea.  
|                    |                       | - W.3.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.  
|                    |                       | - SL.3.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.  
|                    |                       | - SL.3.2. Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.  
|                    |                       | - L.3.6. Acquire and use accurately grade-appropriate conversational, general academic, and domain-specific words and phrases, including those that signal spatial and temporal relationships (e.g., After dinner that night we went looking for them).  
|                    |                       | **Grade 4:**  
|                    |                       | - RL.4.1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.  
|                    |                       | - RI.4.1. Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.  
|                    |                       | - RI.4.2. Determine the main idea of a text and explain how it is supported by key details; summarize the text.  
|                    |                       | - SL.4.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.  
|                    |                       | - W.4.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.  
|                    |                       | - L.4.6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal precise actions, emotions, or states of being (e.g., quizzed, whined, stammered) and that are basic to a particular topic (e.g., wildlife, conservation, and endangered when discussing animal preservation).  

* Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to provide evidence for conclusions."
This is Leo, Leo Cockroach.
   The lady with the shoe is Mildred Splatt, president and CEO of Waddatoys.
   Leo lives in Ms. Splatt’s desk.
   And though she doesn’t know it,
   Leo works at the toy company, too.

I’ve got you now . . .
You horrible little
bug!
Leo is a toy tester.
He works at night. And he’s good at his job.
Testing toys is hard work, and it can be downright dangerous for a cockroach.
WHEEE!

NOW!

FIRE!

OUCH!

YIKES!
When Leo finds a winner, he takes it back to Ms. Splatt's office with the help of his only real friend, a cat named Bernard.

It hadn't taken long for Mildred Splatt to realize that these little gems would fly off the shelves of the toy store. And she had come to rely on these nocturnal surprises to keep her company in business.
At first Leo’s flying abilities left something to be desired. But after a few minor corrections, he was flying like a fly. Soon he would be landing in the office of Mr. Magnus Worm, president and CEO of Notsogouda Toys.
When he came to, Leo found himself in a furnished cage, front and center on the desk of the boss himself.

“Well, well, well,” thought Leo, “this isn’t half bad.”

Mr. Worm seemed a pleasant enough fellow when he strode through the door.

After introducing himself, Leo described how he had gotten to Mr. Worm’s office.

“Now,” said Leo, “if you will open the door of my beautiful new home, I will begin testing your fine toys.”

“I think it would be better if we brought the toys to you,” Magnus Worm replied.

“How marvelous,” thought Leo. “Finally I’m getting the respect I deserve.”

LET'S GET TO WORK!
Mr. Magnus Worm was as angry as a swarm of bees. Things were looking bad for Leo. Worse, in a way, than when he worked for Mildred Splatt.
Leo thought, “If I could just get out of this cage, I’d head back across the street. Better to run from a shoe than to live like a slave.”

As luck would have it, Mr. Worm placed a rocket on his desk for Leo’s judgment.
It was poorly made and badly painted, but it was Leo’s only chance. Winging it, Leo made up a story about having to test-fly the rocket before he could rate it.
Surprisingly, Magnus Worm agreed.
When he opened his eyes, the first thing he saw was his friend, Bernard. Such joy, such happiness!

Leo told Bernard about his life at Notsogouda Toys, and Bernard told Leo about how Mildred Splatt hadn’t had a hit toy since Leo had left. She was bugging out.

“Well, then,” said Leo, “I had best get my legs in gear. But I’m telling you right now, my good cat, it’s not going to be like it was before. No more trying to stomp me or poison me or anything. I’m taking your advice. I’m going to write Mildred a letter.”
Ms. Splott,

My name is Leo.
I am the cockroach.
you were trying to squash.
I am also the fellow who was putting
the really good toys on your desk.
I have been away, but now I’m back.

I understand that business
has not been good since I left.
If you stop trying to step on me,
I will do my best to help you.

I know you like your job
as much as I like mine.
So enough with the shoes already.

Sincerely,
Leo Cockroach
Leo Cockroach
TOY TESTER

And things worked out for Leo, even better than he expected.
Toy Testing

http://vimeo.com/102046596
Toy Testing

You are a toy tester for Waddatoy Toys! Follow this procedure for each toy, and record your data below.

1. Play with the toys! Then draw and label each toy below.

<table>
<thead>
<tr>
<th>Toy A Drawing</th>
<th>Toy B Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Give each toy a fun rating:

<table>
<thead>
<tr>
<th>Toy A</th>
<th>Toy B</th>
</tr>
</thead>
<tbody>
<tr>
<td>![not fun]</td>
<td>![not fun]</td>
</tr>
<tr>
<td>![sort of fun]</td>
<td>![sort of fun]</td>
</tr>
<tr>
<td>![very fun]</td>
<td>![very fun]</td>
</tr>
</tbody>
</table>

3. Give each toy a safety rating:

<table>
<thead>
<tr>
<th>Toy A</th>
<th>Toy B</th>
</tr>
</thead>
<tbody>
<tr>
<td>![not safe]</td>
<td>![not safe]</td>
</tr>
<tr>
<td>![sort of safe]</td>
<td>![sort of safe]</td>
</tr>
<tr>
<td>![very safe]</td>
<td>![very safe]</td>
</tr>
</tbody>
</table>

4. Which toy would you prefer to buy? Why? ___________________
<table>
<thead>
<tr>
<th>Toy</th>
<th>Fun Factor</th>
<th>Safety Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Popper</td>
<td>A. Not fun</td>
<td>A. Not fun</td>
</tr>
<tr>
<td></td>
<td>B. Sort of fun</td>
<td>B. Sort of fun</td>
</tr>
<tr>
<td></td>
<td>C. Way Fun</td>
<td>C. Way fun</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Toy</th>
<th>Fun Factor</th>
<th>Safety Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese Finger Trap</td>
<td>A. Not fun</td>
<td>A. Not fun</td>
</tr>
<tr>
<td></td>
<td>B. Sort of fun</td>
<td>B. Sort of fun</td>
</tr>
<tr>
<td></td>
<td>C. Way Fun</td>
<td>C. Way fun</td>
</tr>
</tbody>
</table>
Chemical Change Café Video

http://vimeo.com/39744527
Question break

- What questions do you have?
- What are your thoughts about what we’ve covered so far?
* Summary

* New Learning

* Application

* Picture
<table>
<thead>
<tr>
<th>Summary</th>
<th>When you read about spider monkeys you will learn about their way of life. They don’t go on the ground a lot because they are easy to be predators and they love to eat fruit and flowers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Learning</td>
<td>Spider monkeys communicate with each other by whooping, gabbling, and barking.</td>
</tr>
<tr>
<td>Application</td>
<td>I would use this information to tell people about spider monkeys. It helps me find out even more about spider monkeys.</td>
</tr>
<tr>
<td>Picture</td>
<td>Draw a picture that goes with what you learned today.</td>
</tr>
</tbody>
</table>

*Spider monkey eat fruit & flowers.*
Why I Became A Scientist

Also in this issue:
- What Do You Get
- 5E Instructional Model
- Introducing Dr. Mike
- Book Nook
- Red Cabbage Experiment

www.sciencemattersonline.com
The 5E Instructional Model is commonly referred to as the 5E Model. The 5E model describes a teaching sequence that can be used for entire programs, specific units, and individual lessons. The 5E model plays a significant role in the curriculum development process as well as the enactment of curricular materials in science classrooms. The 5E places students at the center of their learning experiences, encouraging them to explore, construct their own ideas, and relate to other concepts. An explanation of the 5E model follows:

**Engage**
- The purpose of this introductory stage is to capture students' interest. The experiences mentally engage the students with an answer or question. Engagement ideas can include:
  - Assessing prior knowledge
  - Reading aloud
  - Asking questions about the real world
  - Considering possible responses to questions
  - Observing surroundings

**Explore**
- The teacher provides students with an opportunity to work with an activity to explore ideas through hands-on activities. The students are:
  - Investigating
  - Discussing solutions with others
  - Collecting and organizing data
  - Designing, planning, building models
  - Experimenting with materials

The 5E Learning Cycle is designed for the teacher and students to move in and out of as the lesson/unit progresses. If we had to select one E that is the most important Exploring would be the one. It is here that the teacher and students understand the concept.

**Explain**
- In this phase, students explain their understandings of the concepts and processes they are learning. The teacher helps students to clarify their learning, misconceptions they may have, and introduce new information. Teachers and students are:
  - Clarifying understandings
  - Defining concepts and terms
  - Sharing understandings
  - Forming generalizations
  - Constructing and explaining a model
  - Forming new wonderings

**Elaborate**
- This phase allows students to apply what they have learned and extend their knowledge and skills. During this phase the students are:
  - Building on their understandings of concepts
  - Making decisions
  - Applying knowledge and skills to other disciplines
  - Asking new questions
  - Sharing information orally and in writing

**Evaluate**
- During this phase the students assess their own knowledge, skills, and abilities. It also allows the teacher to evaluate students' progress. During the evaluation phase students are:
  - Drawing conclusions using evidence from previous experiences
  - Producing a product
  - Performance events
  - Summative assessments
  - Journaling

For additional information on the 5E Model please visit the following websites:
- [http://prezi.com/6qfrwk30d8k7/5e-instructional-model/](http://prezi.com/6qfrwk30d8k7/5e-instructional-model/)
- [http://www.bscs.org/curriculumdevelopment/features/5escet.html](http://www.bscs.org/curriculumdevelopment/features/5escet.html)

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**Introducing Dr. Mike**

Dr. Mike Heithaus has served as Director of the Marine Sciences Program, and is now Director of the School of Environment and Society, which brings together the natural and social sciences and humanities to develop solutions to today's environmental challenges.

His research efforts include the Shark Bay Ecosystem Project in Western Australia. He also serves as a Research Fellow with National Geographic, using remote imaging in his research and hosting a Criticat television series on the National Geographic Channel. His current research centers on predator-prey interactions among vertebrates. Dr. Heithaus is currently working with the teachers and students in the Blue Springs, Center, Hickman Mills, and Wellington-Napoleon school districts with lessons on Shark Bay in Western Australia.
**Book Nook**

**A Drop Around the World**
Author: Barbara Shaw McKinney
Illustrated by Michael S. Maydak
ISBN: 1689320736

A clever poem that follows a drop of water on the "Jet Stream Express" from a cloud near Maine. Symbols appearing throughout the book illustrate the different phases and transformations that the drop goes through on its journey.

Joe would use this book for a lesson on the water cycle. It would be a good group piece and could be used as a shared read with partners at a workstation. The teachers could make their own water cycles in zippered bags using food coloring, plastic caps, and water.

Mt. Jesina Sorrenson
Science Instructional Coach K-5

**Red Leaf, Yellow Leaf**
Author/Illustrator: Lois Ehlert
ISBN: 0152661972

This is a beautiful picture book that traces a sugar maple seed to full development. (This book goes well with "Project Bud Burst." This is the story about a sugar maple tree and the child who planted it. They are friends, growing up together. Come share in their relationship and see what a good friend a tree can be. Who knows, you might even decide to plant one of your own.

Bilba Bell
Science Instructional Coach K-5

**Never Smile At A Monkey- and seventeen other important things to remember**
Author: Steve Jenkins
ISBN: 061896620X

Do you know why you should NEVER smile at a monkey? You'll have to read this engaging children's book written and illustrated by Steve Jenkins to find out. This book grabs you from the beginning and doesn't let go!

Jenkins gives the readers tips on when to do if they happen to encounter one of these dangerous animals. Examples include, NEVER CONFRONT A KANGAROO: A kangaroo can deliver a kick powerful enough to cave in a person's chest. NEVER CLUTCH A CANE TOAD: It's harmless except for two large sacs of venem on its neck. If pressed, these pouches squirt out a blinding, and sometimes deadly poison. This would be a great book for reluctant readers!

Chris Glider
Science Instructional Coach K-5

**A Picture Perfect Lesson**

NSTA authors, Karen Ansberry and Emily Morgan, spent a week with the Science Matters teachers in July sharing their Picture-Perfect Science program, which integrates reading strategies into inquiry-based science lessons through the use of picture books. The teachers participated in model lessons from their two books, Picture-Perfect Science Lessons and More Picture-Perfect Science Lessons, published by the National Science Teachers Association, and they were introduced to a variety of high-quality science-related picture books. "We know it is difficult sometimes to fit inquiry-based science experiences into the elementary school day because of the focus on language arts and mathematics. So, we believe that by integrating science and reading, we can give students more opportunities to learn about science. The picture books also give students a context for the science they are learning, which makes the concepts more meaningful," said Morgan.

In addition to reading strategies and inquiry-based science, the program incorporates the research-based SE Instructional Model from 3 SCCS. Each lesson is organized with the 3E Engage, Explore, Explain, Evaluate, and Elaborate, a constructivist model that allows students to have an experience first and then build their knowledge based on that experience. Another important topic teachers explored was addressing student misconceptions in science and identifying picture books with misconceptions in the text or illustrations.

Ansberry and Morgan believe that learning should be a joyful experience and that attitude into their trainings. Ansberry says, "Our program is not just about the reading strategies, 3Es, inquiry, and addressing misconceptions; it's about the joy of learning. It is about rediscovering a sense of wonder about the world and your students. That's the heart of our program." The Picture-Perfect Science duo will be back in a few months to do some follow-up training with the Science Matters teachers.

**Resources:**
View a list of our favorite books.

www.sciencemattersonline.com
Water Cycle Song

http://vimeo.com/101825734
Primary video

https://vimeo.com/101888833
Intermediate video
Implementation

Resource Books, Literature Sets, & Class Packs

Resource Books

Literature Sets

Class Packs
Trade books can be a valuable addition to the science curriculum, if teachers know how to select good ones.  

Diana C. Rice
Identifying and Selecting Quality Trade Books

Types of literature
Accuracy
Believable characters
Realistic passage of time
Race and/or gender equity
Quality of illustrations
Fact distinguishable from fantasy or fiction
Current information

www.pictureperfectscience.com
http://www.nsta.org/publications/ostb/?lid=tnav
Picture-Perfect Science Facebook group
RESOURCES

Amazon.com
Advanced Search
Key Word – Science
Subject – Children’s Literature
Reader Age – 4-8

http://www.nsta.org/recommends/
RESOURCES

A list of their favorite trade books to use with science lessons can be found on our website.

*Favorite Children’s Picture Books for Teaching Science in Grades K-6*

Follow them on Facebook and get new recommendations

www.pictureperfectscience.com
Picture-Perfect Science Lessons: Using Children’s Books to Guide Inquiry, Grades 3-6

This book of 20 ready-to-teach lessons for upper elementary students features engaging, science-related picture books that are tied to inquiry-based science lessons. Lessons are organized using the 5Es Instructional Model and reading strategies are embedded throughout.

Lessons
- Earthquakes
- Name That Shell
- Rice is Life
- What’s Poppin’?
- Mystery Pellets
- Close Encounters of the Symbiotic Kind
- Turtle Hurdles
- Oil Spill
- Sheep in a Jeep
- Chemical Change Café
- The Changing Moon
- Day and Night
- Grand Canyon
- Brainstorms: From Idea to Invention
- Bugs!
- Batteries Included
- The Secrets of Flight
- Down the Drain

Correlations
Next Generation Science Standards
- Picture-Perfect Science NGSS Correlations
- More Picture-Perfect Science NGSS Correlations
- Even More Picture-Perfect Science NGSS Correlations

ELA Common Core
- Picture-Perfect Science and Common Core
- More Picture-Perfect Science and Common Core

For Ohio Educators
- Picture-Perfect Science and Ohio’s New Standards for K-5 Science
- More Picture-Perfect Science and Ohio’s New Standards for K-5 Science
"LINKING INQUIRY & CONTENT"
"LINKING INQUIRY & CONTENT"

Videos
Choose a category below

Matter & Energy
Living Organisms
Force & Motion
Mixtures – Dissolve to Resolve

Conservation of Mass & Matter

Chemical Change Cafe

Science Measures Up

Batteries Included
RESOURCES

Under the resources tab you will find a section on children’s literature recommended by our k-6 teachers.
Next Time You See Series from NSTA Kids

Next Time You See a SUNSET

Next Time You See a SEASHELL

Next Time You See a FIREFLY

Next Time You See a PILL BUG
Author Visits to Work with Teachers
Thanks to today’s presenters!

Kim Stilwell
Blue Springs R-IV School District
National Science Teachers Association
David Evans, Ph.D., Executive Director
Al Byers, Ph.D., Associate Executive Director, Services

NSTA Virtual Conference Team
Flavio Mendez, Senior Director, NSTA Learning Center
Ted Willard, Program Director, NGSS@NSTA
Jennifer Horak, NGSS Project Manager
Eddie Hausknecht, Web and Database Developer
Dayna Anderson, Manager, NSTA Learning Center Help Desk
Jeff Layman, Technical Coordinator, NSTA Learning Center
Stephanie Erickson, e-Learning Coordinator