Implementing Picture Perfect Science

Presented by Dr. Donna Barrett, Metro RESA

www.mresa.org
Think about a powerful learning experience that you had in elementary school.
Metro RESA

- One of 16 regional services state agencies that partner with school districts
- Offer endorsements (Gifted, Reading, ESOL, K-5 science, K-5 mathematics, Teacher Leader); alternative certification, TAPP
- And, professional development within schools, districts and onsite (Smyrna)
- [www.mresa.org](http://www.mresa.org) for a listing of science classes that include differentiation, integrating STEM and literacy
Schedule for Today

- **8:30 am - 11:30 am**
  - Grades 3-5 – Picture Perfect Science

- **11:30 am - 12:30 pm** - LUNCH

- **12:30 pm - 3:30 pm**
  - Grades K-2 – More Picture Perfect Science
Resources in your schools

- [Picture-Perfect Science Lessons](https://www.youtube.com/watch?v=4950xSgAKyI)
- [More Picture-Perfect Science Lessons](https://www.youtube.com/watch?v=4950xSgAKyI)
Other Science Resources

www.nsta.org
NSTA Press

See K-5 Resources List for more details

www.aimsedu.org
AIMS Foundation
<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Can you make the ball roll from one end of the track and stop in the cup?</td>
<td></td>
<td></td>
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<tr>
<td>2. Can you make the ball roll faster?</td>
<td></td>
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<tr>
<td>3. Can you make the ball roll more slowly?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Can you make the ball go over a hill on your roller coaster?</td>
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<tr>
<td>5. Can you make the ball go over two hills on your roller coaster?</td>
<td></td>
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<tr>
<td>6. Can you make the ball go through a loop on your roller coaster?</td>
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</tbody>
</table>
## Dropping Balls

<table>
<thead>
<tr>
<th>Object 1</th>
<th>Object 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ball</td>
<td>Marble</td>
</tr>
<tr>
<td>Ball</td>
<td>Paper Clip</td>
</tr>
<tr>
<td>Ball</td>
<td>Penny</td>
</tr>
<tr>
<td>Penny</td>
<td>Toy</td>
</tr>
<tr>
<td>Paperclip</td>
<td>Toy</td>
</tr>
</tbody>
</table>
Anna drops a bowling ball and a paper clip from the same height at the same time.

1. Which object will hit the ground first?
   a. Paper clip
   b. Bowling ball
   c. Both will hit at the same time

2. Which will hit the ground the hardest?
   a. Paper clip
   b. Bowling ball
   c. Both will hit just as hard

3. Which force causes objects to fall?
   a. Friction
   b. Gravity
   c. Air

PPS: Roller Coasters!
Anna drops a bowling ball and a paper clip from the same height at the same time.

1. Which object will hit the ground first?
   a. Paper clip
   b. Bowling ball
   c. *Both will hit at the same time*

2. Which will hit the ground the hardest?
   a. Paper clip
   b. *Bowling ball*
   c. Both will hit just as hard

3. Which force causes objects to fall?
   a. Friction
   b. *Gravity*
   c. Air
Jessie tied the same rubber band to two of his toys

1. Which toy is the heavier?
   a. The toy elephant
   b. The toy truck
   c. They weight the same

2. Gravity is always:
   a. Pulling things
   b. Pushing things
   c. Lifting things

PPS: Roller Coasters!
Jessie tied the same rubber band to two of his toys

4. Which toy is the heavier?
   a. The toy elephant
   b. **The toy truck**
   c. They weight the same

5. Gravity is always:
   a. **Pulling things**
   b. Pushing things
   c. Lifting things
Roller coasters

- Where on the track would a roller coaster be going the fastest? Circle the correct answer.

PPS: Roller Coasters!
Discuss

- Consider the sequence of the lesson and identify:
  - What was the hook? **ENGAGE**
  - How did you **EXPLORE**?
  - When in the lesson was the concept **EXPLAINed**?
  - How was the lesson **EXTENDed**?
  - How was the content **EVALUATEd**?
5 E Learning Cycle Model
## 5 E Learning Cycle

<table>
<thead>
<tr>
<th>Engage</th>
<th>Activity which focuses the students attention; hook</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explore</td>
<td>Activity which gives students time to think and investigate/test/make decisions/problem solve and collect information; connect to prior knowledge</td>
</tr>
<tr>
<td>Explain</td>
<td>Activity which allows students to analyze their exploration; time to reflect and clarify misconceptions</td>
</tr>
<tr>
<td>Extend</td>
<td>Activity which expands and solidifies student thinking and/or apply to real world setting</td>
</tr>
<tr>
<td>Evaluate</td>
<td>Activity which allows the teacher for assess student performance and understandings</td>
</tr>
</tbody>
</table>
Learning Cycle Research

- Is based on conceptual change
- Explanation should come after the exploration
- Explaining a concept before providing experiences results in little or no conceptual understanding
- Students need time to explore – explain – elaborate on concepts
- The dissatisfaction with knowledge is an important first step towards conceptual change
We spend most of our time....

- The “hook”
- The “play”
- The “ah-ha”
Sheep in a Jeep Video

- www.sciencemattersonline.com
**Chemical Change Café, 5th**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3CS1, S4CS1, S5CS1</td>
<td>Take responsibility for understanding the importance of being safety conscious.</td>
</tr>
<tr>
<td>S3CS3, S4CS3</td>
<td>Identify and practice accepted safety procedures in manipulating science materials and equipment.</td>
</tr>
<tr>
<td>S3CS8, S4CS8, S5CS8</td>
<td>Scientific investigations may take many different forms, including observing what things are like or what is happening somewhere, collecting specimens for analysis, and doing experiments.</td>
</tr>
<tr>
<td>S4CS3, S5CS3</td>
<td>Measure and mix dry and liquid materials in prescribed amounts, exercising reasonable safety.</td>
</tr>
<tr>
<td>S5P2</td>
<td>Students will explain the difference between a physical change and a chemical change.</td>
</tr>
</tbody>
</table>

**Grade 5:**

RL.5.1. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

RI.5.1. Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

RI.5.2. Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

RI.5.3. Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

RI.5.4. Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

SL.5.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 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 by making comments that contribute to the discussion and elaborate on the remarks of others.
- d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.

W.5.10. 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.5.6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (e.g., however, although, nevertheless, similarly, moreover, in addition).
Chemical Change Cafe
<table>
<thead>
<tr>
<th>Definition</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examples</td>
<td>Non-examples</td>
</tr>
</tbody>
</table>

**Chemical Change**
<table>
<thead>
<tr>
<th>Physical</th>
<th>Chemical</th>
</tr>
</thead>
</table>

PPS: Chemical Changes Café
### Pancakes, Pancakes

<table>
<thead>
<tr>
<th>Physical</th>
<th>Chemical</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cutting wheat</td>
<td>• Burning wood for a fire</td>
</tr>
<tr>
<td>• Separating grain from chaff</td>
<td>• Cooking the pancake</td>
</tr>
<tr>
<td>• Grinding wheat</td>
<td></td>
</tr>
<tr>
<td>• Squirting milk in the pail</td>
<td></td>
</tr>
<tr>
<td>• Churning butter</td>
<td></td>
</tr>
<tr>
<td>• Melting butter</td>
<td></td>
</tr>
<tr>
<td>• Chopping wood</td>
<td></td>
</tr>
<tr>
<td>• Breaking an egg</td>
<td></td>
</tr>
<tr>
<td>• Stirring the batter</td>
<td></td>
</tr>
</tbody>
</table>
Optional Activity

- Make pancakes in class
- Writing Task: Is cooking pancakes a physical or chemical change? What is your evidence?

PPS: Chemical Changes Café
## New Menu Items

**Toast** – we begin with a plain piece of white bread and heat it until it turns brown and produces a delightful smell.

**Orange juice** – Lovely oranges are hand squeezed until the delicious juice drips into your glass.

**Scrambled eggs** – Grade A eggs are cooked until they are light and fluffy.

**Strawberry smoothie** – we begin with strawberries, ice, sugar and milk. We blend them together to make a delicious drink.

**Trail mix** – we mix together the finest fresh nuts and dried fruits to create this tasty blend.

**Buttermilk biscuits** – creamy buttermilk, baking powder, flour, butter, and salt are mixed together and baked until gas bubbles cause them to rise. The batter turns into flaky, golden brown biscuits. The aroma is delightful.

**Cottage cheese** – fresh milk is combined with special enzymes until the milk becomes thick and clumpy with a new taste and smell.

**Fruit salad** – fresh pineapple, strawberries, kiwi, and blueberries are sliced and mixed together to make a sweet treat.

**Toasted marshmallows** – fluffy white marshmallows are toasted over an open flame until they begin to turn golden brown and smell heavenly.

**PPS:** Chemical Changes Café
**New Menu Items**

<table>
<thead>
<tr>
<th>****Toast</th>
<th>we begin with a plain piece of white bread and heat it until it turns brown and produces a delightful smell.</th>
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</thead>
<tbody>
<tr>
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<td>Lovely oranges are hand squeezed until the delicious juice drips into your glass.</td>
</tr>
<tr>
<td><strong>Scrambled eggs</strong></td>
<td>Grade A eggs are cooked until they are light and fluffy.</td>
</tr>
<tr>
<td><strong>Strawberry smoothie</strong></td>
<td>we begin with strawberries, ice, sugar and milk. We blend them together to make a delicious drink.</td>
</tr>
<tr>
<td><strong>Trail mix</strong></td>
<td>we mix together the finest fresh nuts and dried fruits to create this tasty blend.</td>
</tr>
<tr>
<td><strong>Buttermilk biscuits</strong></td>
<td>creamy buttermilk, baking powder, flour, butter, and salt are mixed together and baked until gas bubbles cause them to rise. The batter turns into flaky, golden brown biscuits. The aroma is delightful.</td>
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<td>fluffy white marshmallows are toasted over an open flame until they begin to turn golden brown and smell heavenly.</td>
</tr>
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</table>
Turtle Hurdles
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.

**RI.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 **RI.3.3.** Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.

**RI.3.7.** Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur).

**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.3.4.** With guidance and support from adults, produce writing in which the development and organization are appropriate to task and purpose.

**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*).
| **S3L1a**   | a. Differentiate between habitats of Georgia (mountains, marsh/swamp, coast, Piedmont, Atlantic Ocean) and the organisms that live there.  
|            | d. Explain what will happen to an organism if the habitat is changed |
| **S3L1c**   | Identify features of animal that allow them to live and thrive in different regions of Georgia |
| **S3CS6**   | Support statements with facts found in books, articles, and databases, and identify the sources used. |
ENGAGE: Turtle, Turtle Watch Out Read Aloud

- Call out Turtle, Turtle Watch Out! in unison when that phrase appears in the book
- Touch your nose when you hear an example of a human changing the turtle’s habitat
EXPLORE: Fortune Teller

- You are sea turtles with the goals of hatching safely, crawling across the beach to the ocean, and swimming to deep water under the cover of darkness
  - If your fortune teller reveals that you have been helped by a human or natural factor, stay standing
  - If your fortune teller reveals bad news for you, sit down to represent the loss of that baby turtle
  - If you are still standing after five turns, you have made it to deep water (I will keep a graph of how many turtles are left standing after each turn)
EXPLAIN: Turtle T-Chart

- Open your fortune teller and read all factors that could have affected your sea turtle. Fill out the T-Chart and answer questions below.

<table>
<thead>
<tr>
<th>NATURAL FACTORS</th>
<th>HUMAN FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helped the turtle:</td>
<td>Helped the turtle:</td>
</tr>
<tr>
<td>Harmed the turtle:</td>
<td>Harmed the turtle:</td>
</tr>
</tbody>
</table>

- Do human actions help or harm turtles? Explain.
- Should humans interfere with nature by helping sea turtle? Why?
Which of the Georgia habitats do you think your sea turtle might live in? Why?
EXTEND: Georgia Habitats

What features of the sea turtles do you think allow them to live and thrive in the Georgia habitat in which they live?
Write a letter to a marine conservation organization. Include in your letter:
- 3 facts you learned about sea turtles
- 3 ways sea turtles are harmed by humans
- One reason endangered sea turtles should be helped
- One question you have about sea turtles

Share your letter with your classmates before sending.
Grade 1:
RL.1.1. Ask and answer questions about key details in a text.
RL.1.2. Retell stories, including key details, and demonstrate understanding of their central message or lesson.
RI.1.1. Ask and answer questions about key details in a text.
RI.1.2. Identify the main topic and retell key details of a text.
W.1.2. Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.
W.1.8. With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
SL.1.1. Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
SL.1.2. Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
<table>
<thead>
<tr>
<th>That Magnetic Dog</th>
<th>SKCS3, S1CS3, S2CS3</th>
<th>Use ordinary hand tools and instruments to construct, measure, and look at objects.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKP1</td>
<td></td>
<td>Compare and sort materials of different composition.</td>
</tr>
<tr>
<td>S1CS6, S2CS6</td>
<td></td>
<td>Science involves collecting data and testing hypotheses.</td>
</tr>
<tr>
<td>S1P2, S3P2</td>
<td></td>
<td>Demonstrate how magnets attract and repel. Identify common objects that are attracted to a magnet. Identify objects and materials (air, water, wood, paper, your hand, etc.) that do not block magnetic force.</td>
</tr>
</tbody>
</table>

**Grade 1:**
- **RL.1.1.** Ask and answer questions about key details in a text.
- **RI.1.1.** Ask and answer questions about key details in a text.
- **RI.1.2.** Identify the main topic and retell key details of a text.
- **RI.1.4.** Ask and answer questions to help determine or clarify the meaning of words and phrases in a text. **RI.1.5.** Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text.
- **W.1.2.** Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure.
- **W.1.8.** With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.
- **SL.1.1.** Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
- **SL.1.2.** Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
- **L.1.4.** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 1 reading and content, choosing flexibly from an array of strategies.
  - Use sentence-level context as a clue to the meaning of a word or phrase.
Safety

- Magnets are used in a wide variety of electronic equipment. Placing a magnet close to such equipment may cause damage. Before using magnets, make sure students are aware that magnets should be kept away from electronic equipment.

- Keep magnets away from credit cards, videotapes and any other materials with a magnetic strip.
NO MAGNET ZONE
Engage: What can you catch with a magnet?

<table>
<thead>
<tr>
<th>Items to Test</th>
<th>Prediction</th>
<th>Attracted</th>
<th>Not Attracted</th>
<th>Wonderings</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

MPPS: That Magnetic Dog
What’s magnetic?

- Only materials that contain IRON, COBALT or NICKEL are attracted to magnets.
Alloys

- Mixtures of at least two metals
- Steel – iron and other elements such as carbon (most commons), manganese, chromium and tungsten
- Varying the amount of the materials effects the strength, hardness and ductility
- Brass – alloy of copper and zinc
- White gold – gold, nickel and palladium
Make a Poster to present your findings to the class.
After reading, Magnetic & Nonmagnetic, what are you wondering now?
Evaluate

- Write a story about what you think would happen if you woke up in the morning to find out your feet had mysteriously been turned into magnets.

MPPS: That Magnetic Dog
Other videos

- Loco Beans
- Over the Ocean
Suggested items to test

- Aluminum foil, paperclips, metallic-looking fabrics, cotton balls, pennies, plastic and metal spoons, toothpicks, iron nails, steel wool

- Some of the items we tested today would be too small to use with students
- Class Packs for Focus and Priority Schools
- Schools are responsible for replenishing consumables in the kit
- Picture Perfect Science Lessons are a supplementary resource for teachers to support student understanding of the GPS. Other curricula should also be used.
- A supplementary resource list has been provided.
Picture Perfect in APS

- Picture Perfect Science lessons are correlated with the National Science Education Standards (NSES).
- The authors have correlated them with GPS and CC-GPS.
- A list of suggested grade levels to avoid duplication of lessons.
Share Point Resources

- PPS and MPPS alignment to GPS and CC-GPS
- Recommended alignment to K-5 grade levels (Excel spreadsheet)
Six Key Reading Strategies in PPS

- Making Connections
- Questioning
- Visualizing
- Inferring
- Determining Importance
- Synthesizing
Why Read Aloud in Science?

- Being read to is the most influential activity for building the knowledge required for eventual success in reading (Anderson, Heibert, Scott, and Wilkinson 1985)
- Opportunity to **model** the strategies of proficient readers
- Students’ **minds are free** to explore the meaning of difficult science concepts when the teacher does the **decoding**
- Fine-tunes **students’ observational/listening skills**