



**Read. Write. Science!**

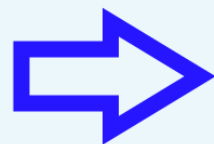
# Literacy Strategies for 5<sup>th</sup> Grade Science

Jodi Wheeler-Toppen, Ph.D.



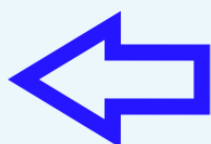
# Elementary School

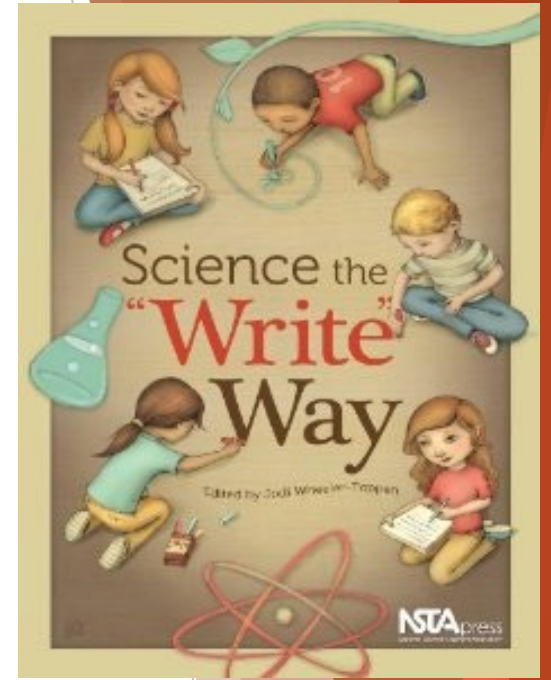
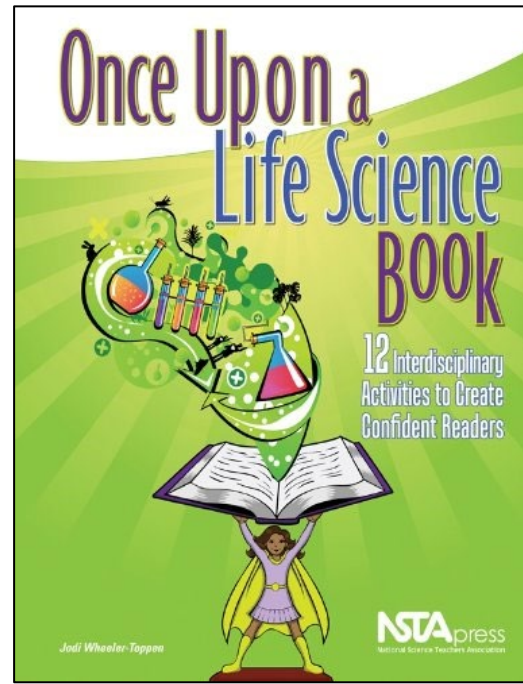
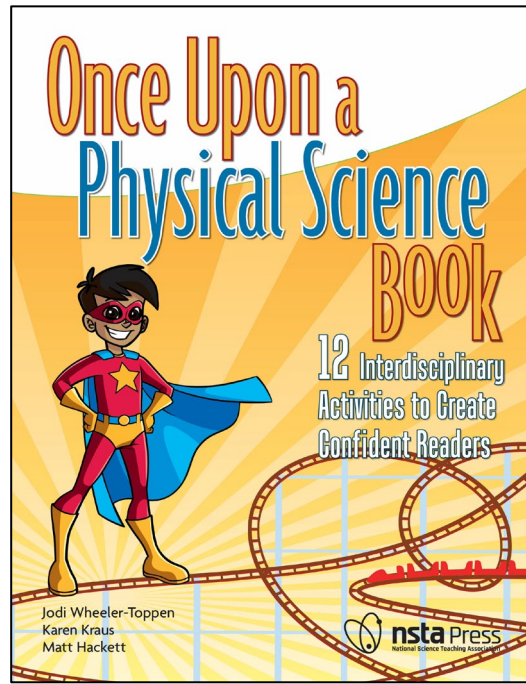
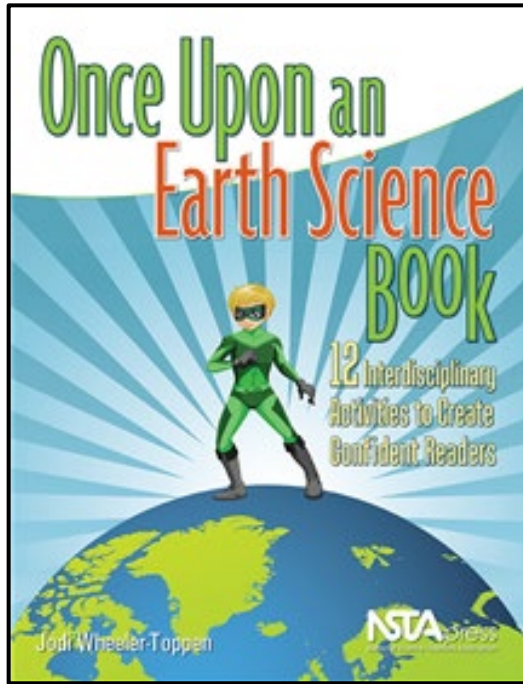
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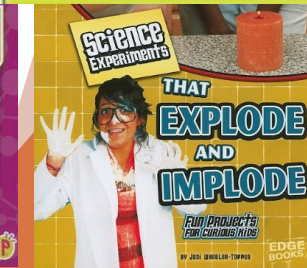
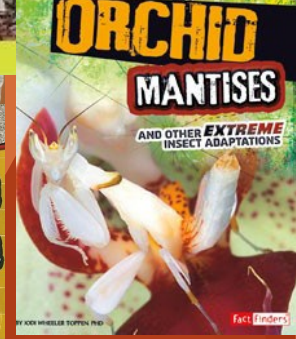
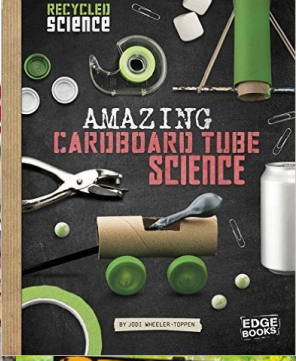
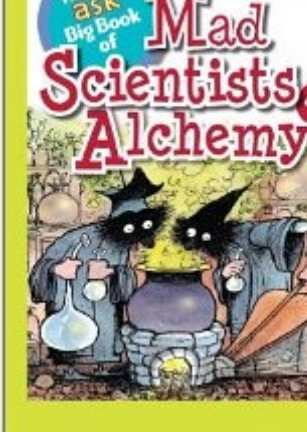
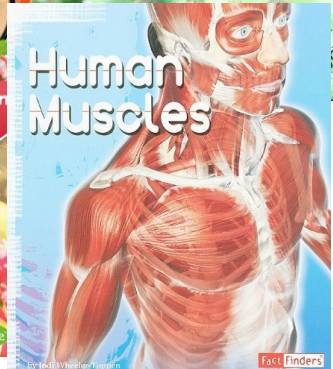
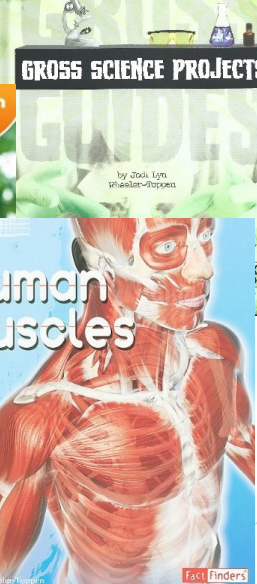
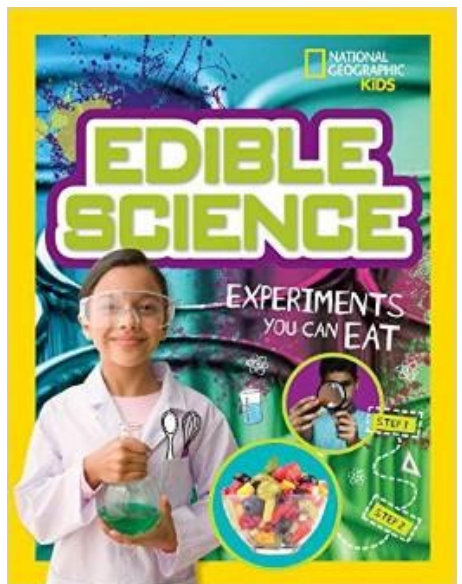
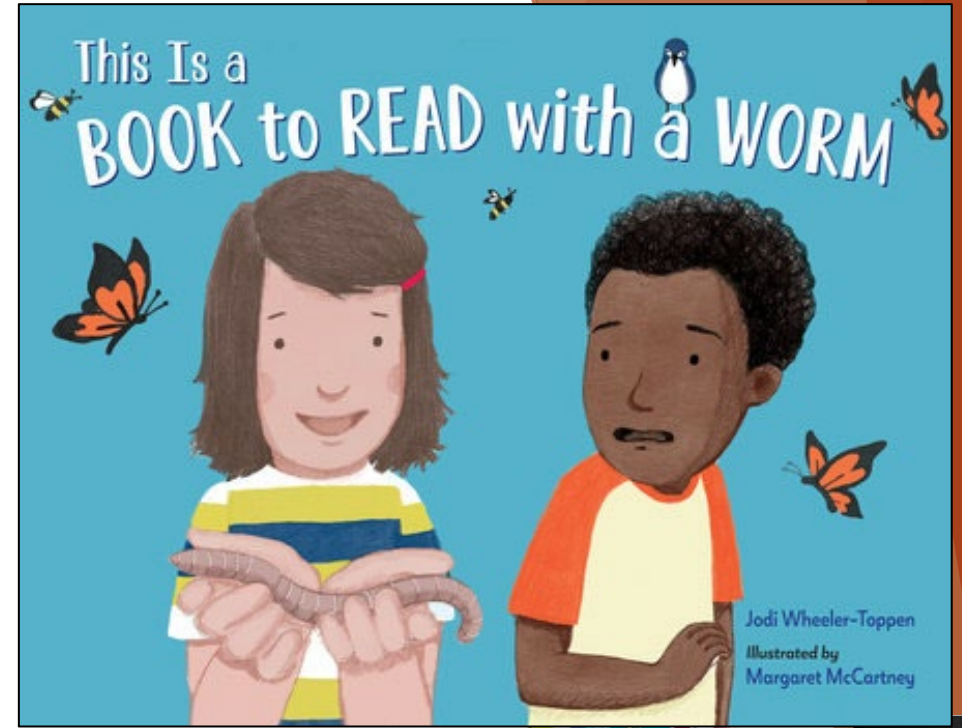
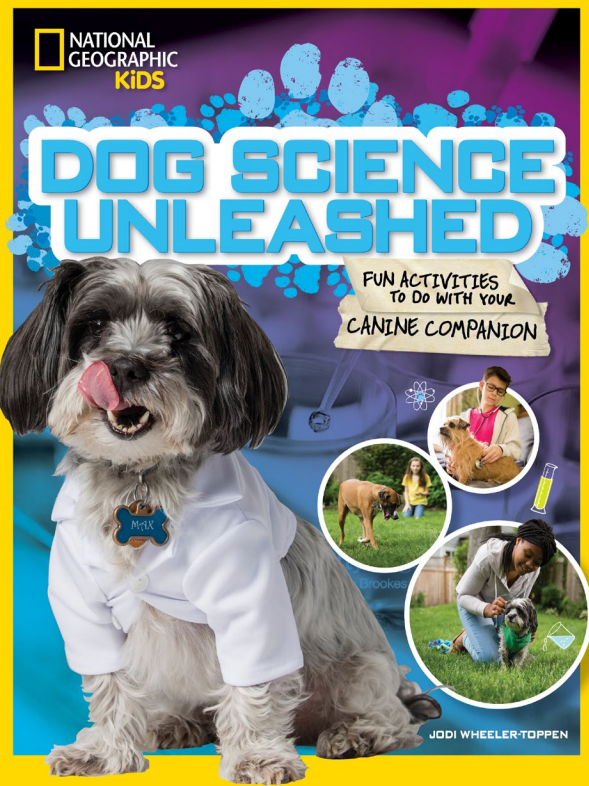
science (and social studies)

MATH





# Who I Am and How I Ended Up Here



Find Powerpoint here.  
Also, sign up for  
newsletter!



OnceUponAScienceBook.com



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WheelerToppen



@JodiWheelerToppen



@WheelerToppen

Connect with Me

# Your Turn!

- ▶ Please share your name and something you are passionate about in your teaching.

# What problems do we want to solve?

- ▶ Please share specific
  - ▶ problems that arise around reading and writing in your classroom
  - ▶ administrative requests (demands?) around reading/writing/science that you are having a hard time meeting

# Agenda

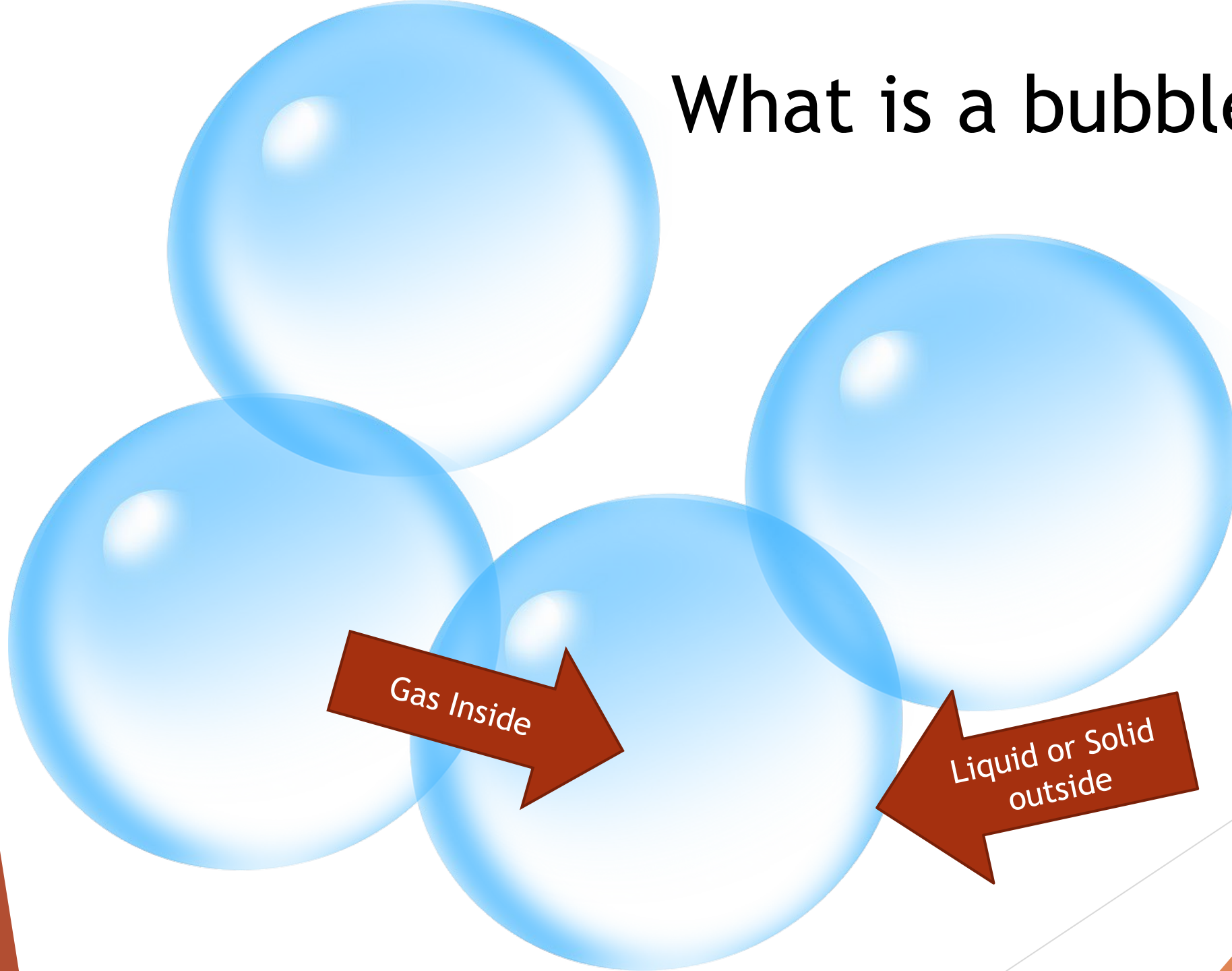
- ▶ Work through a sample lesson (Chemical Change)
- ▶ Literacy Topic (Structure of Literacy Learning Cycles)
- ▶ Work through a sample lesson (Erosion)
- ▶ Break
- ▶ Literacy Topic (Reading Struggles)
- ▶ Work through a sample lesson (Circuits)
- ▶ Literacy Topic (Resources and Reflection)





## Sample Lesson: Chemical Change

# What is a bubble?



Gas Inside

Liquid or Solid  
outside

## Part 1: Two Experiments



# We made something new. What was it?

## Your turn to investigate.

- ▶ 1. Chew up the bubble gum. Use it to make the candle stand up in the center of the cup.
- ▶ 2. Spread baking soda around the candle.
- ▶ 3. Light the candle.
- ▶ 4. Pour vinegar into the cup or bowl until all of the baking soda is damp. Be careful not to pour it on the candle flame!

## Part 2: Reading--French Fry Fiasco

As you read, look for clues that can help you explain what new thing you made by mixing baking soda and vinegar and why it caused the candle to go out.

Underline clues as you find them!

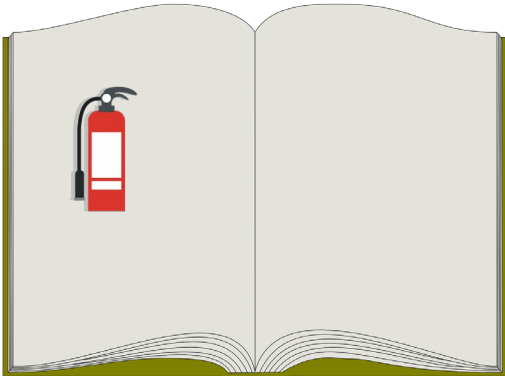
[Copy of reading can be found here:

<https://wheelertoppen.files.wordpress.com/2022/10/french-fry-fiasco.docx>]

# Part 3: Writing

- ▶ Use the clues to create an explanation for why the candle went out in our "Lights Out" activity.
- ▶ Think about organizing your explanation
  - What are your clues?
  - What order should you present them in to make a logical argument?
  - What science words will you need to include?
  - Don't just list your clues. Fill in information so the clues make sense as an explanation.

# Lesson Structure



**(Engage)**

**Exploration**

**Explanation**

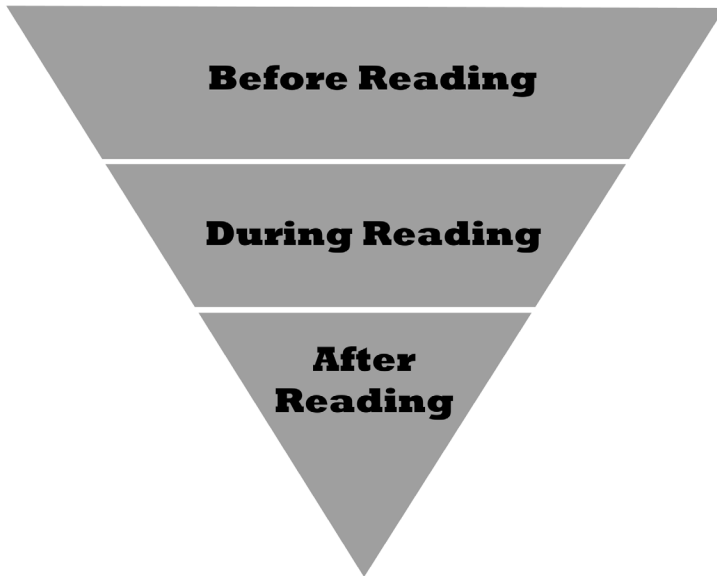
**Concept Application**

**(Evaluate)**

**+**

**+**

**+**



**=**

**=**

**=**

**Investigate the science concepts and build knowledge needed for the text**

**Read for clues to what they saw while exploring and for more information**

**Write to integrate ideas from observations and text**

**Science Learning Cycle**

**Reading Lesson**  
**(after Berkeley and Barber 2015)**

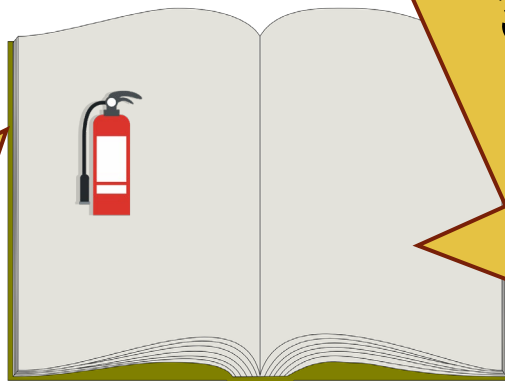
**Literacy Learning Cycle**



More Complex Literacy Learning Cycle



Reading Strategy



Writing Strategy



# Reflection Point 1

Jot your thinking at this point. Consider questions such as:

- ▶ What part of what we've been doing/ talking about makes sense to you?
- ▶ What ideas for your own class do you have now?
- ▶ What do you disagree with or what would you do differently?
- ▶ What thoughts do you just need to get out of your head?
- ▶ What questions do you have?

Would anyone like to share any thoughts or questions?

As we go through the next sample lesson, be looking for the parts of the literacy learning cycle.



# Sample Lesson 1: Mountain Mayhem

Chapter 5 of *Once Upon an Earth Science Book*

# Part 1: Mountain Mayhem

- ▶ Become a destructive force! Cause as much damage to your road as you can, following the guidelines below:
  1. Use only the tools you are given.
  2. Do not touch the sand, container, or table.
  3. The only tool that can touch the sand directly is your ice cube. You can set it in one place and press it slowly down the mountain.
- ▶ Safety Note: As soon as you are finished with your straw, tie it in a knot. Place it in the trash so no one else will put it in their mouth!

# Part 2: Learn About Destruction on a Real Mountain

▶ Article on pages 50-52

▶ But first...

REMEMBER YOUR CODES  
! This is important.  
✓ I knew that.  
X This is different from what I thought.  
? I don't understand.

### The Water That Hauled Off a Highway

On August 28, 2011, Tropical Storm Irene swept into Vermont, dumping rain. Almost every river and stream in the state overflowed its banks. Entire sections of Route 4 washed away, leaving cliffs as tall as a two-story building in their place. The people in the town of Killington were trapped, with no roads left for driving in or out.


Water is the most common vehicle of erosion. Individual raindrops can scatter dirt. Water collects on parking lots and then races off the side as a sheet of water. Rivers rub against their banks and drag off loose dirt and wear away rock. The dirt and rock that gather in the water are called sediment. Eventually, the water slows down and the sediment sinks and is left behind.

Wind also contributes to erosion. Think of a sand storm in a desert. Wind whips across the ground with such force that sand is pushed into the air and driven in the direction the air is moving. When the wind dies down, the sand falls and leaves behind a sand dune.

Dirt, mud, and rocks on the surface of the Earth are constantly shifting their location. The flooding in Vermont simply sped up a process that sometimes takes hundreds or thousands of years. It's the process of erosion: the movement of rock and soil from one place to another.


Even ice causes erosion. During an ice age, blocks of ice miles wide and high build up from snow that never melts. These glaciers creep across the landscape at a rate of only a few inches a year, pushing debris

**Destruction caused by Hurricane Irene**



**How Erosion Happens**  
Gravity is the driving force of erosion. Consider a landslide in which rocks tumble off a mountain. Which way do the rocks fall? Down! The rocks are pulled down by the same attractive force that pulls everything toward the Earth.

**Sand dune in Utah's Coral Pink Sand Dunes State Park**



# Reading Skill: Comprehension Coding

As you read, mark the article with the following codes:

*! This is important*

*✓ I knew that*

*x This is different from what I thought*

*? I don't understand*

You don't have to mark every sentence!

# Coding

- ! *This is important*
- ✓ *I knew that*
- x *This is different from what I thought*
- ? *I don't understand*

Water is the most common vehicle<sup>?</sup> of erosion. Individual raindrops can scatter dirt. Water collects on parking lots and then races off the side as a sheet of water. ✓ Rivers rub against their banks and drag off loose dirt and wear away rock. The dirt and rock that gather in the water are called sediment. ! Eventually, the water slows down and the sediment sinks and is left behind.



## Part 3: Write about it

► Digger Johnson has just gotten a contract to build a road into the side of a mountain. He doesn't know a thing about erosion. Write Mr. Johnson a letter explaining how erosion could affect his road. Give him some suggestions for protecting it.

What lesson parts did we have?

More Complex Literacy Learning Cycle

Reading Strategy

Writing Strategy



# Three Impediments to Reading Success



The belief that reading is essentially a process of saying the words rather than actively constructing meaning from texts is widespread among many students. For instance, one of the students we interviewed looked surprised when he was asked to describe the topic discussed in a section of text he had just read.

***“I don’t know what it was about,”*** he answered, with no sense of irony, ***“I was busy reading. I wasn’t paying attention.”***

(Schoenbach, et al.; Reading for Understanding)

# 3 Impediments to Learning from Text

Impediment 1: Students do not expect what they are reading to make sense.

# 3 Impediments to Learning from Text

Impediment 1: Students do not expect what they are reading to make sense.

## Responses:

- Start a classroom conversation about making sense of what you read.
- Model what successful readers do.

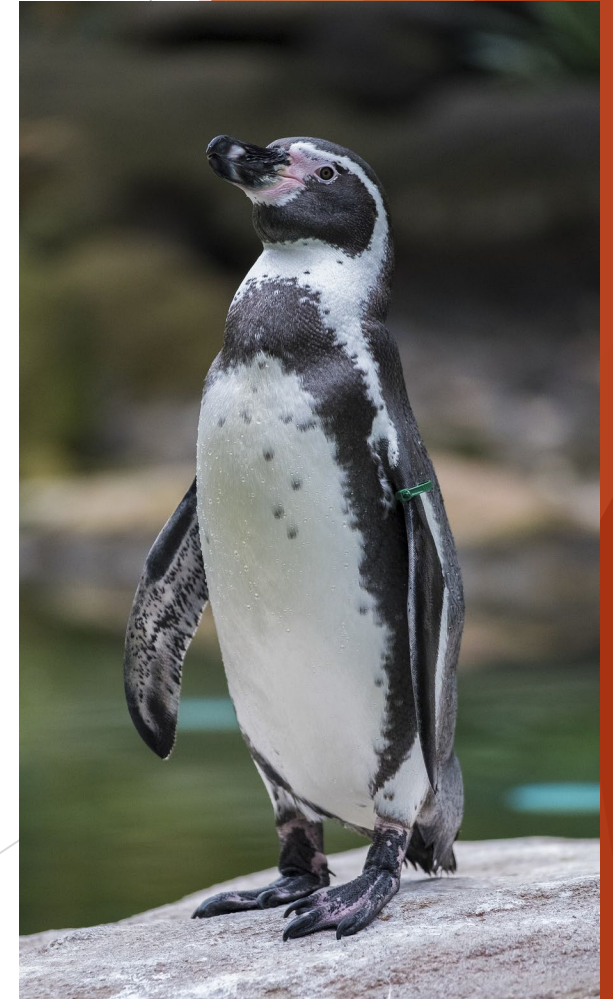
# Start the Conversation

- ▶ Talk about needing to “figure out” as a normal part of reading science.
- ▶ Encourage students to pay attention to what they are thinking as they read.
  - ▶ *You can introduce this idea with drawing (which is non-verbal).*
- ▶ Model the kind of thinking that successful readers use through Thinking Aloud



# Thinking Aloud

All penguins, even those that live in the tropics, have thick, waterproof feathers that keep them warm and dry in the water. These feathers are organized in a pattern called countershading. When they swim, the black feathers on their backs help them hide from any predators looking down from above at the dark ocean water. Similarly, the white feathers on their bellies blend into the light of the sky if they are viewed from below.



## Impediment 2

### Somerset Draw with Durham Hands Notts the Title

After bowling the home side out for 320, Somerset were left needing 181 from 17 overs to guarantee the title. But, at 48-3, the chase was abandoned at Chester-le-Street and a draw agreed.

Fired-up Notts then took the three Lancashire wickets they required at Old Trafford to pick up a sixth bonus point and break Somerset hearts.

Eventually, Trego had Scott Rushworth caught behind and Benkenstein was caught at slip by skipper Marcus Trescothick off Charl Willoughby to set up the Somerset chase.

They went to the crease not knowing if a draw would be good enough to hold off Notts and immediately lost Kieswetter, promoted up the order, when he was bowled by Somerset old boy Blackwell.

## 3 Impediments to Learning from Text

**Impediment 2: Students do not know the things that the author assumes they already know.**



# Young California Condor

(US Fish and Wildlife)



“Some people were afraid  
the condor would soon be  
gone.”

“I would think the people would  
be afraid when the condor was  
**THERE.**”



~~extinction~~



~~biodiversity~~

# Background knowledge: non-science vocabulary

Adequate	Contradict
Tentative	Characteristic
Substance	Offspring
Deposit	Gradual

(All words used in academic writing, but  
not very often in speech)

# 3 Impediments to Learning from Text

Impediment 2: They lack background knowledge assumed by the text.

## Responses:

- Have students explore before reading!
- Read the text, looking for background they'll need.
- Listen, listen to what they say about the text.
- Consider reading groups or having students think aloud to each other.



## Impediment 3

Ferdie and Niddle gabbled on the plag, plag wert. “Pling,” Ferdie twaddled, “pling apie plee.” Niddle peedled and vang rue sot.

Comprehension Questions:

1. Where did Ferdie and Niddle gabble?
2. What did Ferdie twaddle?
3. What did Niddle do after he peedled?

\*Critical Thinking:

4. Where else might Ferdie and Niddle gabble?

# 3 Impediments to Learning from Text

Impediment 3: They don't have to read to do their school tasks.

Response:

Give them better tasks!

(That is, ask questions that they cannot answer by just copying sentences. Make them use the text in sensemaking!)

## Reflection Point 2

Jot your thinking at this point. Consider questions such as:

- ▶ What part of what we've been doing/ talking about makes sense to you?
- ▶ What ideas for your own class do you have now?
- ▶ What do you disagree with or what would you do differently?
- ▶ What thoughts do you just need to get out of your head?
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Would anyone like to share any thoughts or questions?



# Sample Lesson 2: Zombieville

Lesson Documents:

<https://wheelertoppen.files.wordpress.com/2022/10/zombieville-literacy-learning-cycle.docx>

You have 5 minutes to light your bulb and protect yourself!

1

2

3

4

5

# A word on supplies

I recommend 2.5-3.5 V NON-LED lights

With a battery pack that holds 2-3 AAA or AA batteries (adding up to 3-4.5 V)



Now we're going to read two articles that will give you more information on surviving Zombieville.

- ▶ As you read, underline information that might help someone get their light built in time.

# Reading Skill: Compare text structures

- a. How are these two texts different from each other? How are they similar?
- b. How are they structured differently? (Help them observe that one is a letter giving a narrative of one person's experience and the other is a description of how something works)
- c. Who do you think the audience is for each text? That is, who did the writer think might need to read this text?
- d. What information from this text will help you with your Zombieville challenge?



# Letter to Next Year's Fifth Graders

▶ The letter from Jaime Smith did not have all the information you needed to build a circuit. Write a better letter, telling next year's fifth graders how to survive the Zombieville emergency. Using a How-to format, explain what students should do to successfully assemble a light source that will save them from the zombies. Include all the parts of the light source. Include a diagram to help them.

▶ Writing Skill:

In science text, diagrams and illustrations often partner with words to give information. When writing includes diagrams, it should also guide the reader to know when to look at the image and what the reader should be looking for.

Try phrases like:

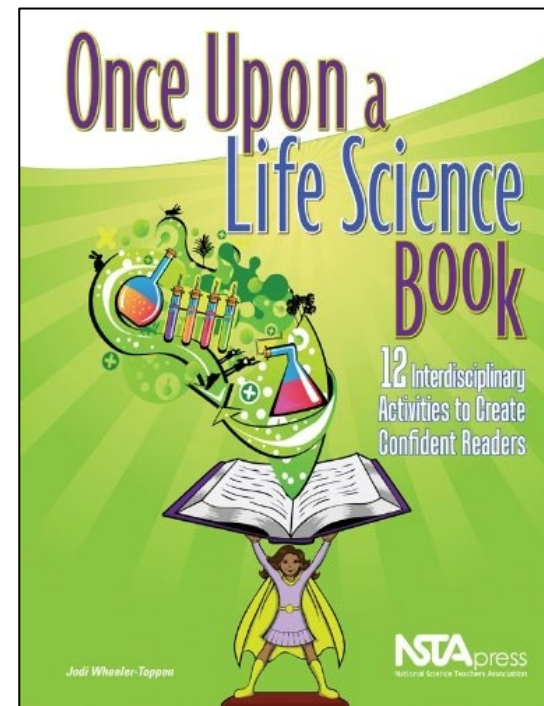
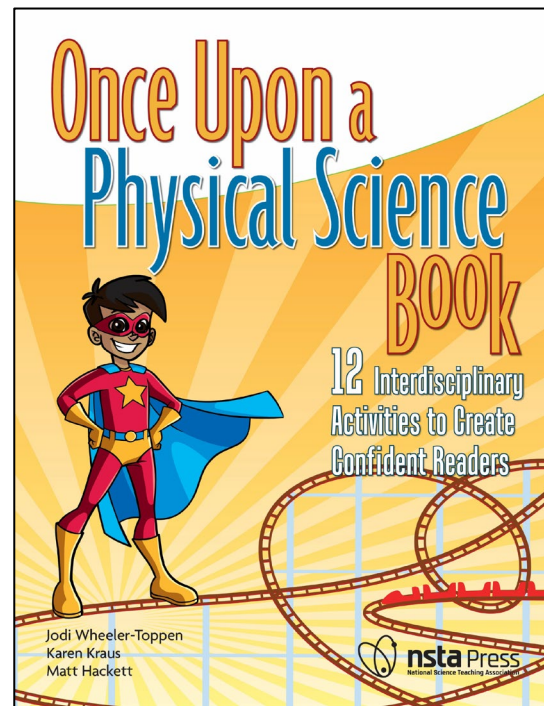
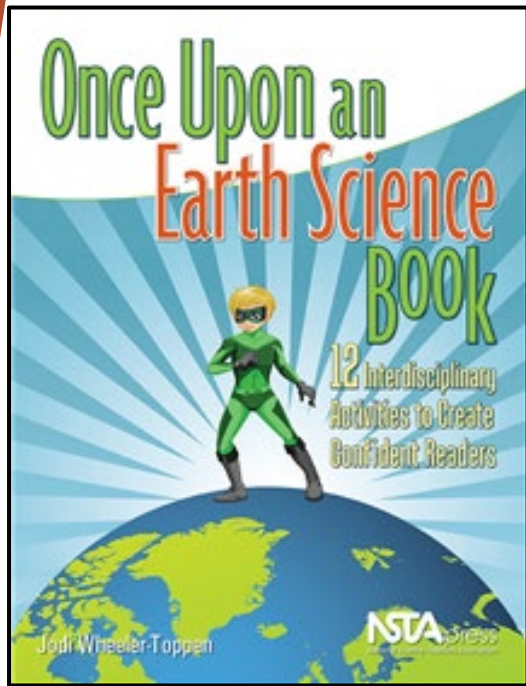
As you can see in the picture...

The diagram shows...

Look at the picture and notice....

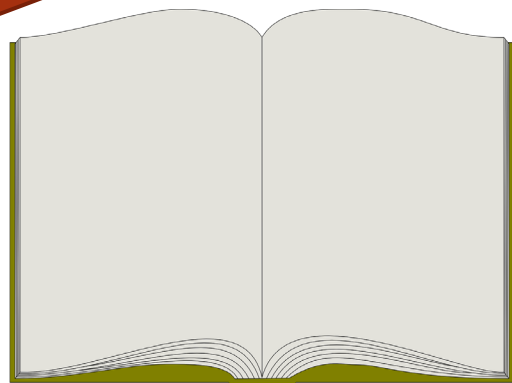
# Literacy Topic: Choice and Resources

Video (pick a topic); Looking through the life/ physical books; resources on website related to the books; GADOE lessons



Where can I find Literacy Learning Cycles?

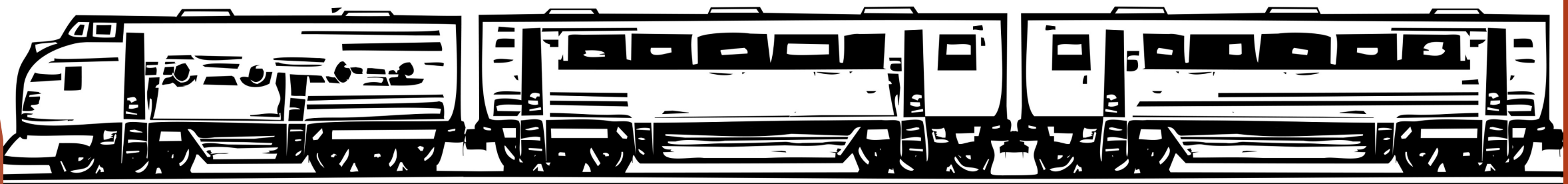
More Complex  
Literacy Learning  
Cycle



Real Science

Analytical Reading

Academic Writing



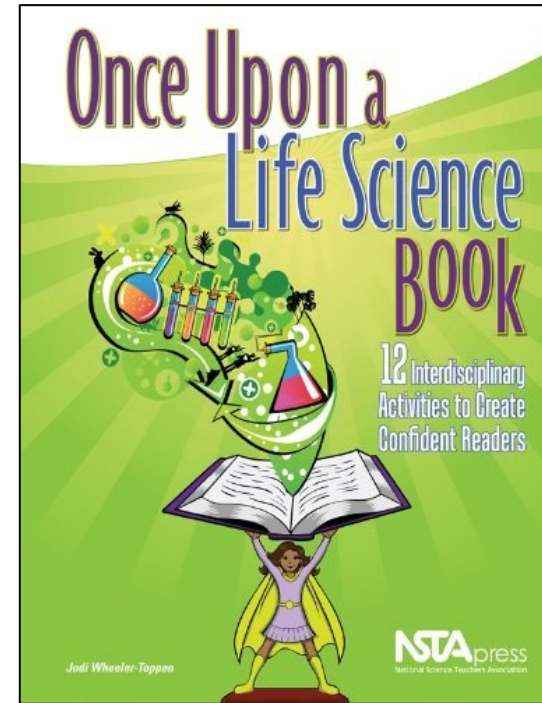
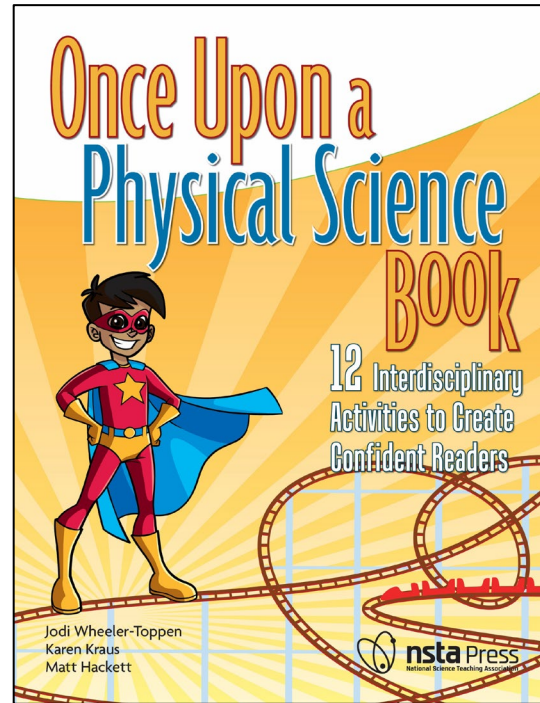
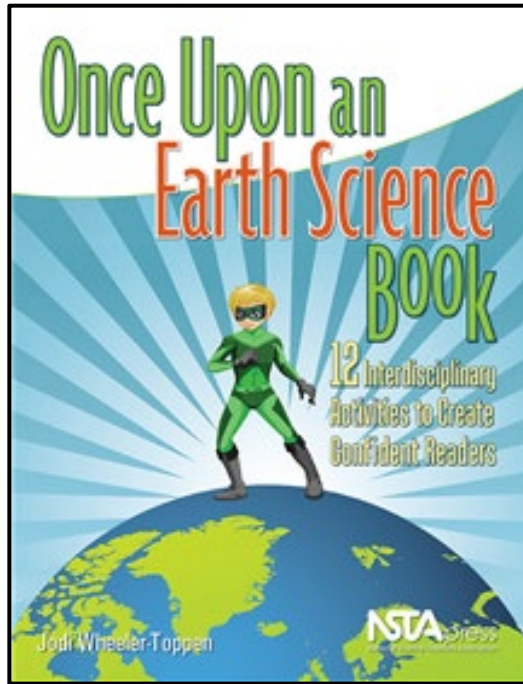
## Related Resources

- ▶ <https://onceuponasciencebook.com/for-educators/resources-for-teaching-online-with-the-once-upon-books/>

# Georgia DOE Literacy Learning Cycles

- ▶ [Kindergarten Day and Night](#)
- ▶ [First Grade Light](#)
- ▶ [Second Grade Shadows](#)
- ▶ [Third Grade Fossils](#)
- ▶ [Fourth Grade Ecosystems](#)
- ▶ [Fifth Grade Erosion](#) ←
- ▶ [6<sup>th</sup> Grade Science Literacy Task: Tornadoes](#)
- ▶ [7<sup>th</sup> Grade Science Literacy Task: Cells](#) ←
- ▶ [8<sup>th</sup> Grade Science Literacy Task: Mixtures](#)

GA DOE may be looking for writers for this style lesson for next summer. I can put your name in if you are interested.



Where can I find more support for reading and writing strategies?

## Elementary:

- [Integrating Writing and Science](#)
- [Integrating Reading and Science](#)
- [Writing about Claims, Evidence, and Reasoning](#)
- [Sentence Frames for Reading, Writing, and Forming Science Knowledge](#)

## Middle/High:

- [Integrating Writing and Science:](#)
- [Integrating Reading and Science:](#)
- [Signal Words for Reading, Writing, and Forming Science Knowledge](#)
- [Writing about Claims, Evidence, and Reasoning:](#)

## K-12:

- [Reading Strategies Part 1: Make it Make Sense: For Teachers in Grades K-12](#)
- [Reading Strategies Part 2: Problem-Solving Tools](#)
- [Knowing Enough to Read: How Background Influences Science Comprehension](#)
- [Before and After Writing: Prewriting and Evaluation](#)
- [Integrating Reading, Writing, and Science in the K-8 Classroom: A Call to Action for Administrators](#)





## Reflection Point 3

Jot your thinking at this point. Consider questions such as:

- ▶ What part of what we've been doing/ talking about makes sense to you?
- ▶ What ideas for your own class do you have now?
- ▶ What do you disagree with or what would you do differently?
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Would anyone like to share any thoughts or questions?

# Literacy: *Moving Forward*

- ▶ Let's revisit the concerns from the beginning of the session.

# Reflection Point 4

- ▶ **Action Items.** List specific things you want to do to follow-up on things you learned/ thought about today.
- ▶ Plan to put this list somewhere where you will see it and act on those items.

Would anyone like to share any thoughts or questions?

## Reflection Point 4

- ▶ **Challenge.** We will have a follow-up gathering in January. Between now and then, try at least one time to teach using a literacy learning cycle (with or without a specific reading or writing skill).
- ▶ Take a few minutes now to think about what topic you might try this on. What might you do for each phase of the lesson?

Would anyone like to share any thoughts or questions?

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