Seeds of Science/Roots of Reading
81 New and Engaging Science Books

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a curriculum development *and* research project

Goals

- Introduce the books from the Seeds of Science/Roots of Reading integrated science-literacy curriculum
- Discuss how text can support inquiry
- Discuss how students can inquire into text

- What are some challenges to using text in science class?

Typical concerns about using text in inquiry science

- Concerns about the quality of science texts
- Concerns about the misrepresentation of the scientific enterprise in text
- Concern that introducing text introduces a vocabulary teaching burden
- Concern that text will eclipse discovery

- Why would you want to use text in science class?

Why text in science?

- Not everything we want students to know about science can be learned firsthand in classrooms
- Reading is an authentic way that scientists and nonscientists learn about science
- Reading is an essential act of inquiry—students read to find out
- Science can provide an engaging and authentic context for learning to read

Using Text to Support Inquiry

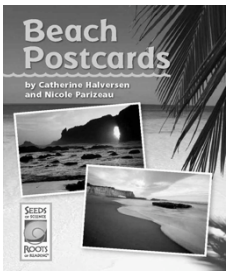
- Text can support, not replace, inquiry science.
- Text can do more than provide the answers.
- Science is an engaging context for developing reading skills, strategies, and habits.
- Reading to find out is an act of inquiry.

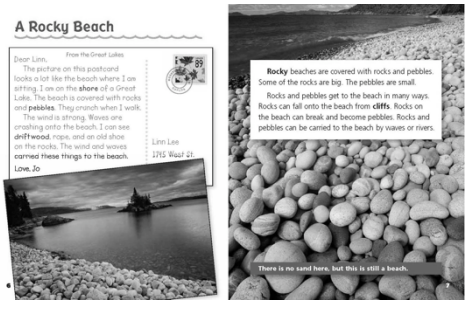
Using Text to Support Inquiry

Text ⟷ Experience

Both text and experience provide students with evidence about the natural world.

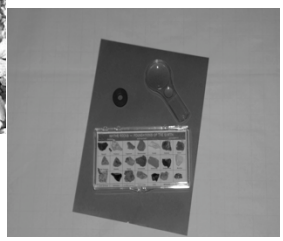
Read about beaches



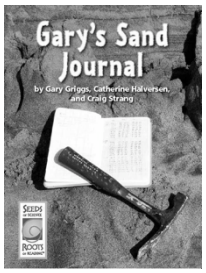


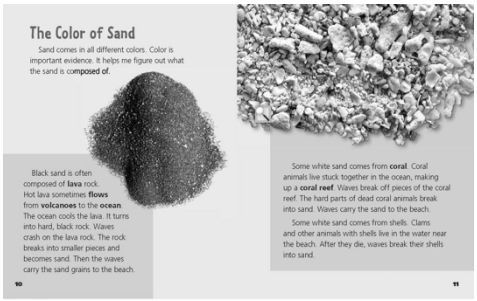
Investigate a model beach

Observe sand samples



Read to find out how a shoreline scientist observes sand





Discuss findings in expert groups and **write** reports

Roles of Text in Inquiry Science

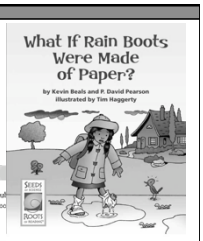
Provide context	Connect to the world outside the classroom
Deliver content	Read to learn about science
Model	Demonstrate a process or disposition
Support secondhand investigations	Provide data for students to interpret
Support firsthand investigations	Provide information for investigations

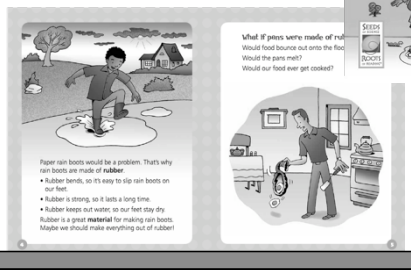
from Cervetti, G.N. & Barber, J. (2009). Text in hands-on science. In Hiebert, E. H. & Sailors, M. (Eds.) *Finding the Right Texts: What Works for Beginning and Struggling Readers*. New York: The Guilford Press.

Providing Context

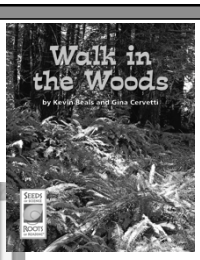
- Introduce domain and/or context
- Invite students to engage with the context
- Connect to the world outside the classrooms

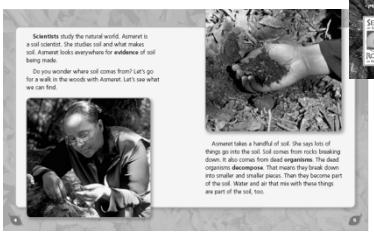
Providing Context
What If Rain Boots Were Made of Paper?





Providing Context
Walk in the Woods

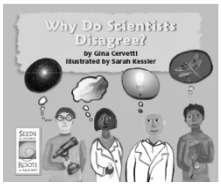


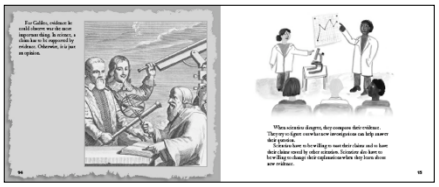


Modeling

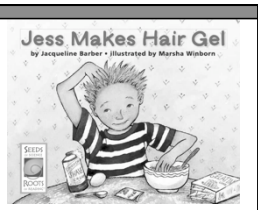
- Model inquiry processes
- Model nature of science
- Model literacy processes

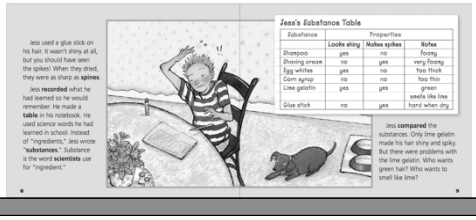
Modeling
Why Do Scientists Disagree?





Modeling
Jess Makes Hair Gel



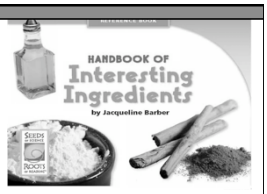


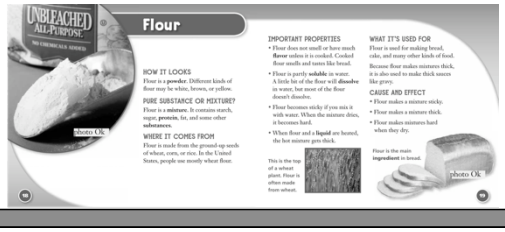
Supporting Firsthand Investigations

- Provide information that facilitates firsthand investigations
- Support students in making sense of firsthand investigations
- Inspire firsthand investigations

Supporting Firsthand Investigations

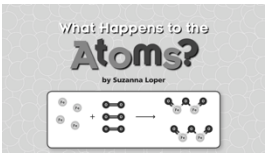
Handbook of Interesting Ingredients

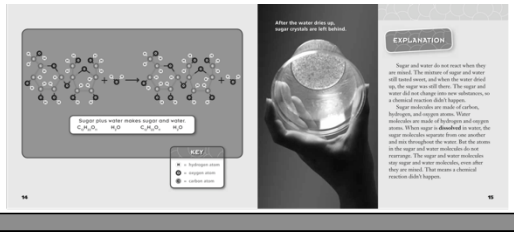




Supporting Firsthand Investigations

What Happens to the Atoms?



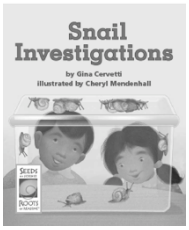


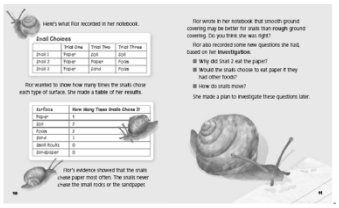
Supporting Secondhand Investigations

- Provide data for students to interpret
  - Numeric data
  - Tabular data
  - Graphs, maps, and charts
  - Photographs and scientific illustrations

Supporting Secondhand Investigations

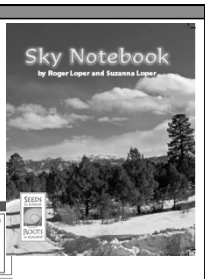
Snail Investigations

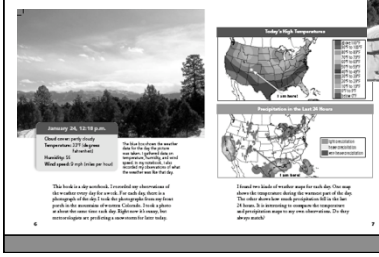




Supporting Secondhand Investigations

Sky Notebook

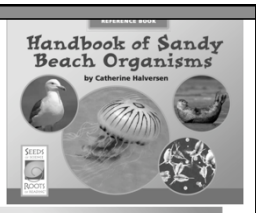


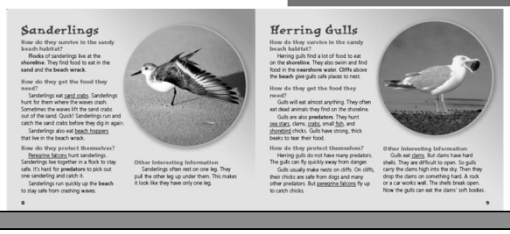


Delivering Content

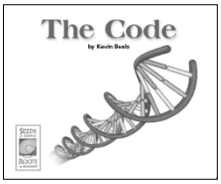
- Deliver science information
- Provide information explanation about unobservable phenomena

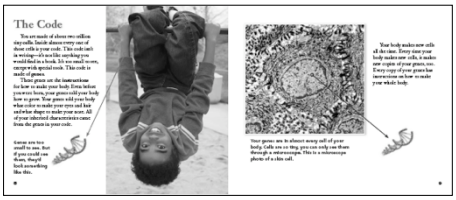
Delivering Content
Handbook of Sandy Beach Organisms



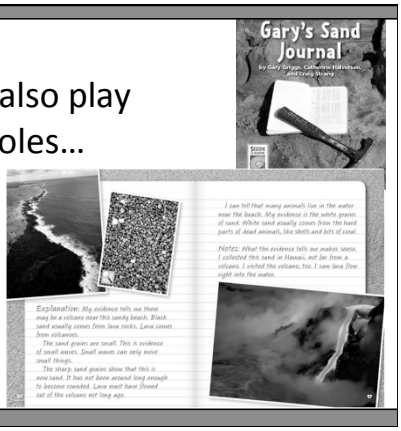


Delivering Content
The Code





Texts can also play multiple roles…



Trade Books

Authenticity in Science

Provide Context	→	Scientists read to situate research
Deliver Content	→	Scientists read to learn findings
Modeling	→	Scientists replicate others' procedures and experiments
Supporting Second-hand Investigations	→	Scientists read and interpret others' data and findings
Supporting Firsthand Investigations	→	Scientists use reference books

Books!

- What role could the book play?
- How might you use the book in your classroom?

Text and Inquiry Cycle

		Provide context	Deliver content	Model	Support secondhand inquiry	Support firsthand inquiry
1	Explore the topic	X	**X**	X	X	
2	Ask a question			X	X	
3	Make a hypothesis		**X**	X		
4	Plan and conduct an investigation			X		X
5	Record and organize data			X		X
6	Analyze results			X	X	
7	Make an explanation based on evidence	X	**X**	X	X	
8	Ask a new question			X	X	
9	Communicate results			X		

Text and Learning Cycle

	Provide context	Deliver content	Model	Support secondhand inquiry	Support firsthand inquiry
Engage	X		X		
Explore	X	X	X		
Explain	X	X	X	X	X
Extend		X	X	X	X
Evaluate			X	X	X

When should you use books to support firsthand science?

- Before firsthand activities
- During firsthand activities
- After firsthand activities

…depending on what role they play in supporting inquiry

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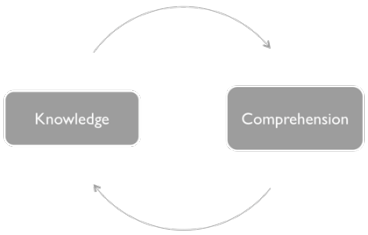
Arguments for the use of text in inquiry science

- Not everything we want students to know about science can be learned firsthand in classrooms
- Reading is an authentic way that scientists and nonscientists learn about science
- Reading is an essential act of inquiry—students read to find out
- Science can provide an engaging and authentic context for learning to read

Using Inquiry to Support Reading



Reading is an Act of Inquiry

- Reading is active
- Many mental processes students use when they inquire —asking questions, making predictions, using what is known to make sense of the unknown, drawing conclusions—are the very same process they use when reading
- Evidence can come from text as well as from direct experience

Inquire Into Text

- Preview the reference book
  - Think about what you already know about the topic
  - Look at the table of contents, headings, bold words, and illustrations
  - Ask yourself what you think you could learn from reading this book
- Pose and record a question
- Use text features to find information related to your question
- Discuss your question, answer, and further questions with someone near you

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- What did you find out?
- How might you help students inquire into books?

Text Accessibility

- Repetition of important science vocabulary words
- Limited number of other difficult words (less than 2%)
- Focused on a few central ideas
- Supportive text features
- Classroom tested

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Want to learn more?

www.seedsofscience.org
www.delta-education.com

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