Knowledge-enhancing Contexts for Literacy

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Science & Literacy

- Seeds of Science/Roots of Reading

Achieving a better balance between content and strategies through disciplinary teaching

- Work on science-literacy integration, or disciplinary literacy in science, at the elementary level.
- My original motives
  - Access to different text genres
  - Opportunities to develop academic language
  - Science inquiry could invite sustained and deep engagement with text

Achieving a better balance between content and strategies through disciplinary teaching

- Work on science-literacy integration, or disciplinary literacy in science, at the elementary level.
- My ~~original~~ revised motives: capitalizing on the benefits of in-depth study
  - Enriching knowledge for engagement and as fuel for future reading
  - Marrying text and experience
  - Treating literacy as a more specialized activity that is intimately tied to context and purpose
  - Conceptual goals and firsthand investigations as the glue that binds together literacy activities
- This necessarily involves authentic use of a range of text genres

The CCSS and Informational Text

- The CCSS puts informational text on an even footing with narrative text.
- But genre is only part of the story…

Knowledge, Disciplinary Learning, and the ELA Common Core State Standards

- Students "build a foundation of knowledge in these fields that will also give them the background knowledge to be better readers in all content areas (CCSSI, 2010, p. 10).
- Curriculum that is "intentionally and coherently structured to develop rich content knowledge within and across grades" (p. 10)
- Students "read purposefully and listen attentively to gain both general knowledge and discipline-specific expertise" (p. 7).

Why knowledge matters for reading

- There is a mountain of evidence that topic knowledge and world knowledge matter for reading, and that students will less knowledge struggle to make sense of text.
- Topic knowledge, domain knowledge, and general world knowledge predict readers' abilities to understand and recall explicit and implicit information from text (Alexander, Kulikowich, & Schulze, 1994; Best, Floyd & McNamara, 2008; Garner & Gillingham, 1991; Lipson, 1983; Pearson, Hansen, & Gordon, 1979; Recht & Leslie, 1998; Walker, 1987)

Why knowledge matters for reading

- Knowledge is especially important for students with lower levels of reading skill
- There may be a "trading relationship" between knowledge and skills where knowledge provides some compensation for low levels of general reading skill (Adams, Bell, & Perfetti, 1990; Miller & Keenan, 2009; Recht & Leslie, 1998; Taylor, 1979).

Why knowledge matters for reading

- Knowledge and strategies are mutually reinforcing
- Topic knowledge may *support* the acquisition and use of reading comprehension strategies (Gaultney, 1995; Pritchard, 1990)).

Why knowledge matters for reading

- Knowledge development motivates engaged reading

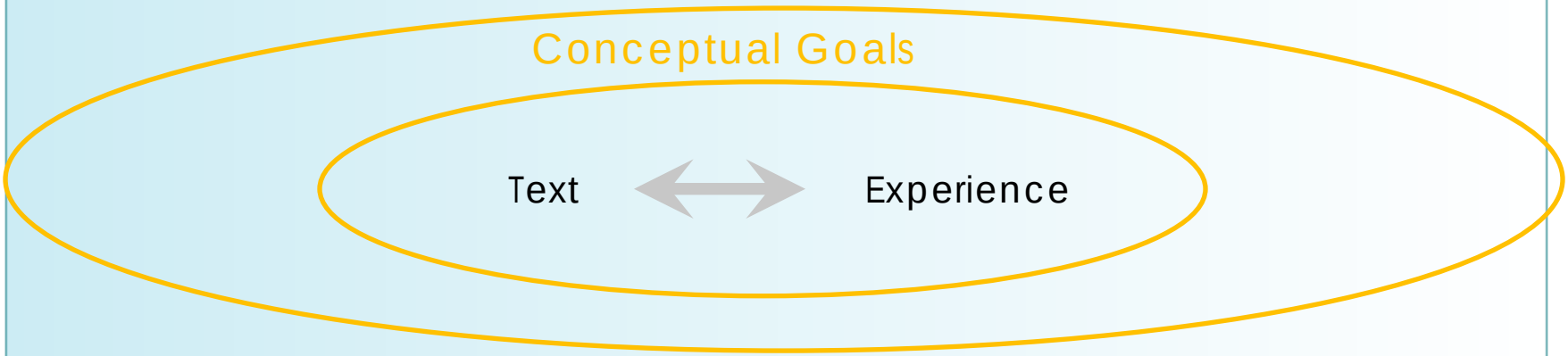
Moving beyond knowledge activation…

- We have to build it intentionally

Moving beyond reading informational texts

- We should support the development of expertise through extended investigations and experiences
- Knowledge development and literacy development go hand-in-hand

An example from Seeds of Science/Roots of Reading



Text and Experience: An Example

A design challenge to develop strong glue.

Conceptual goals:

- Properties of substances
- Mixtures and dissolving
- Design in science

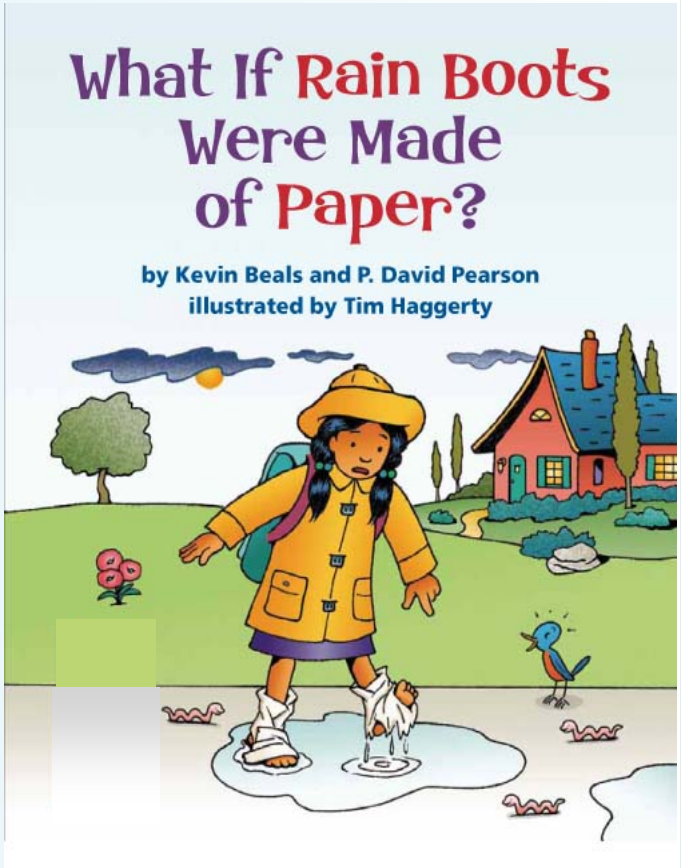
Text and Experience: An Example

Literacy goals:

- Access and apply knowledge.
- Read across texts & expreience to build knowledge.
- Read and write procedural texts.
- Make predictions and inferences based on evidence.

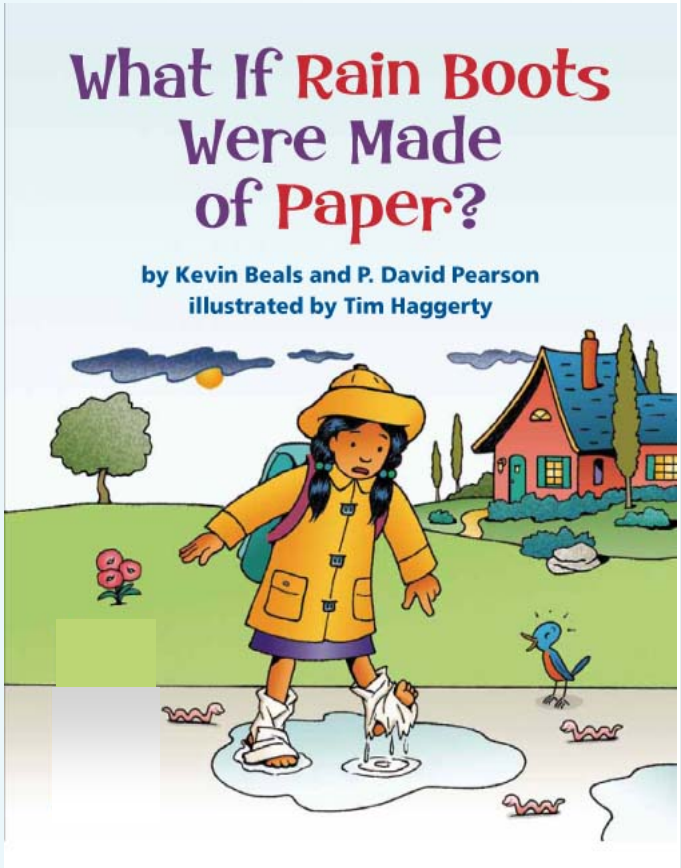
Read to Set Context

Students read a book about the relationship between objects/mixtures, materials, and properties



Read to Set Context

- Introduces the domain and key disciplinary concepts
- Connects concepts in science to students' experiences with objects and materials outside of school
- Students learn to access and apply prior knowledge



Investigate to Test Ingredients

Students test ingredients and mixtures to collect firsthand evidence about which ingredients are stickiest.

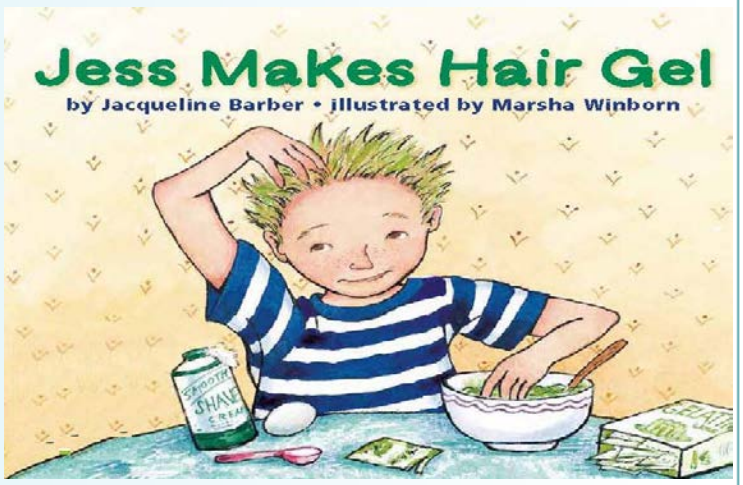
Reflect on Results

Students evaluate the test results and decide which ingredients to use to make their first glue mixture.

They make the mixture without a high level of precision in recording.

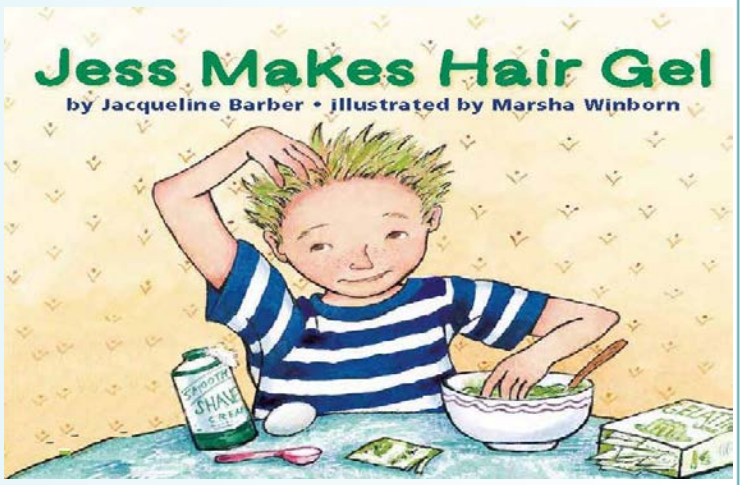
Read for Modeling

Students read a book
that models the design process
and reflect on how they can use
a similar property-driven
design process to refine their
glue mixtures.



Read for Modeling

- Models nature of science
- Models inquiry processes
- Models literacy processes
- Provides data for students to interpret
- Models procedural writing
- Inspire firsthand investigations

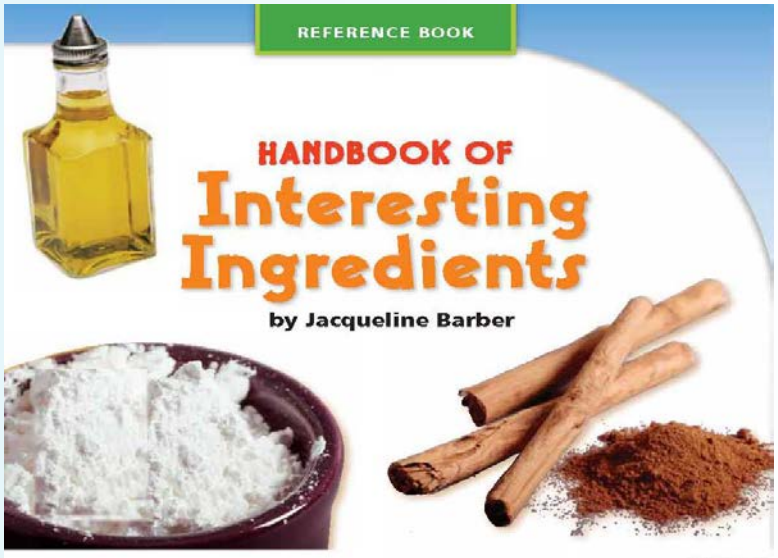


Investigate Additional Ingredients

Students conduct more ingredient tests, this time focusing on other properties, such as strength. Students collect firsthand evidence about which ingredients are strongest.

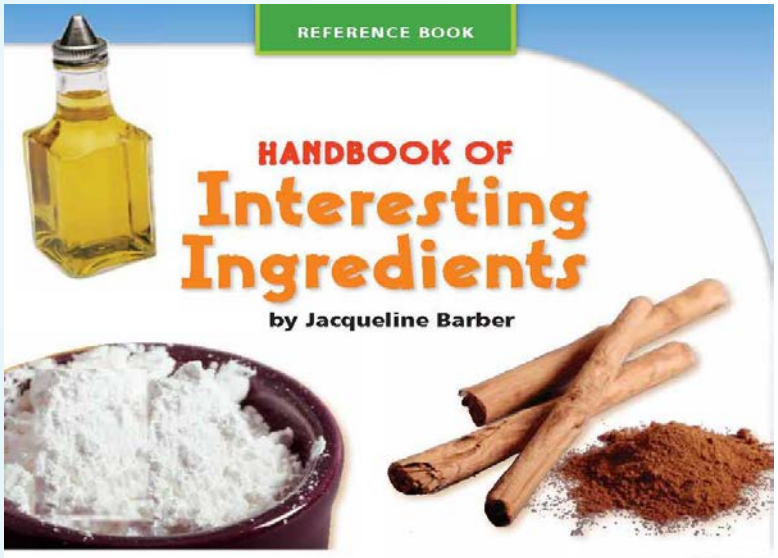
Read for Additional Evidence

Students search in a handbook for evidence about ingredients that might have the properties need to make good glue.



Read for Additional Evidence

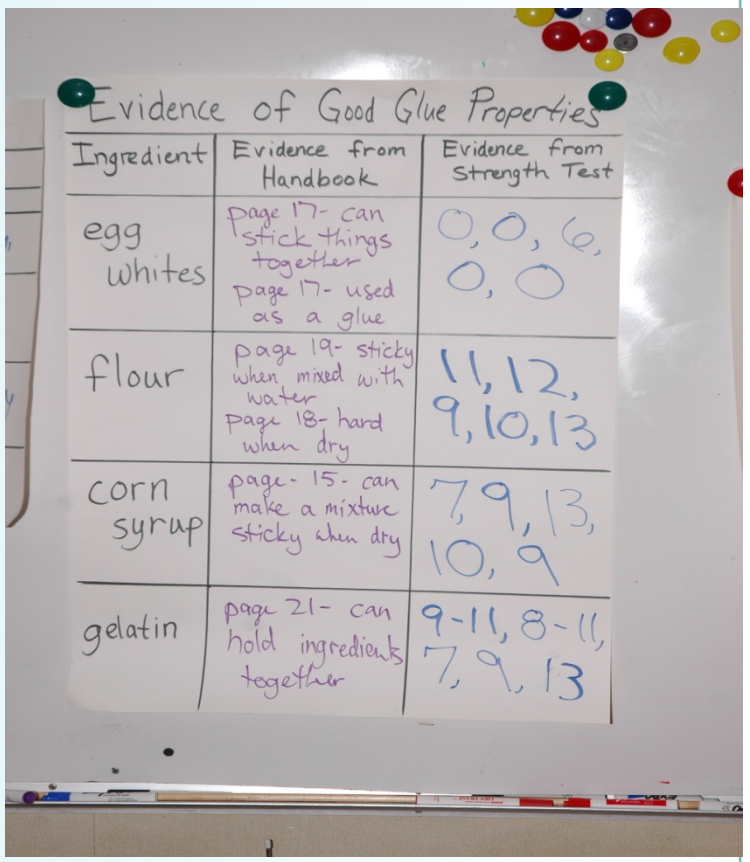
- Provide information that facilitates firsthand investigations
- Support students in making sense of firsthand investigations
- Delivers science information
- Students practice finding information using index



Evaluate Evidence and Make Decisions

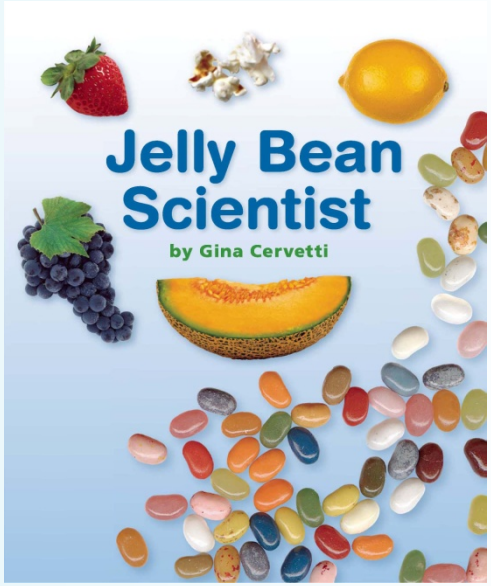
Students evaluate their evidence about glue ingredients from both first and secondhand sources and make decisions about what combination of ingredients will best meet their design goals.

They write recipes (procedural texts) for glue.



Read to Connect

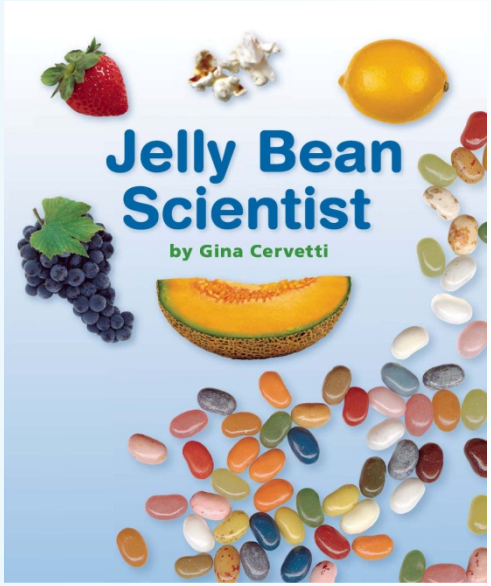
Students read about a food scientist who designs and tests new jelly beans.



Students reflect on how their design process is like that used by the jelly bean scientist.

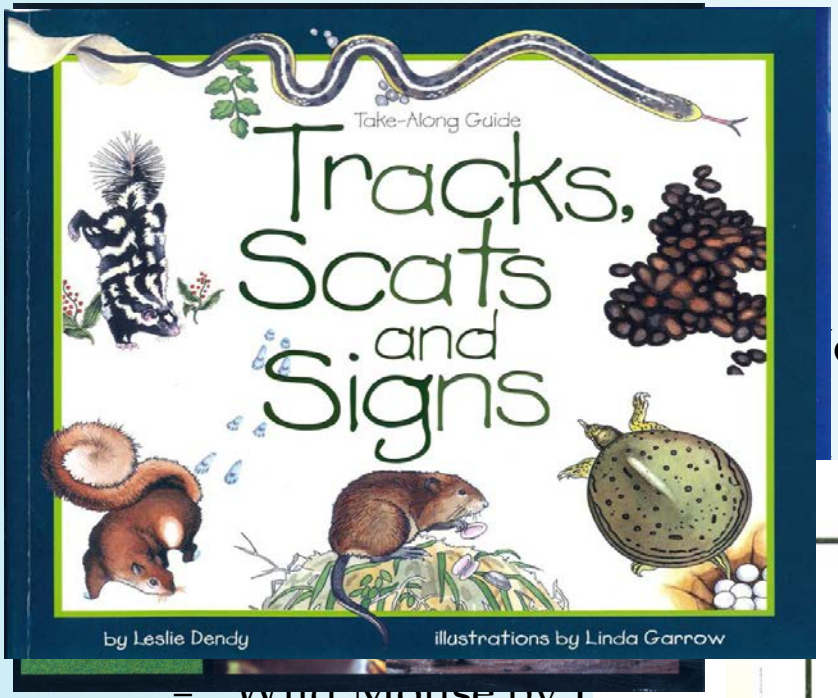
Read to Connect

- Reinforces scientific concepts
- Models scientific testing and nature of science
- Connects back to world outside classroom



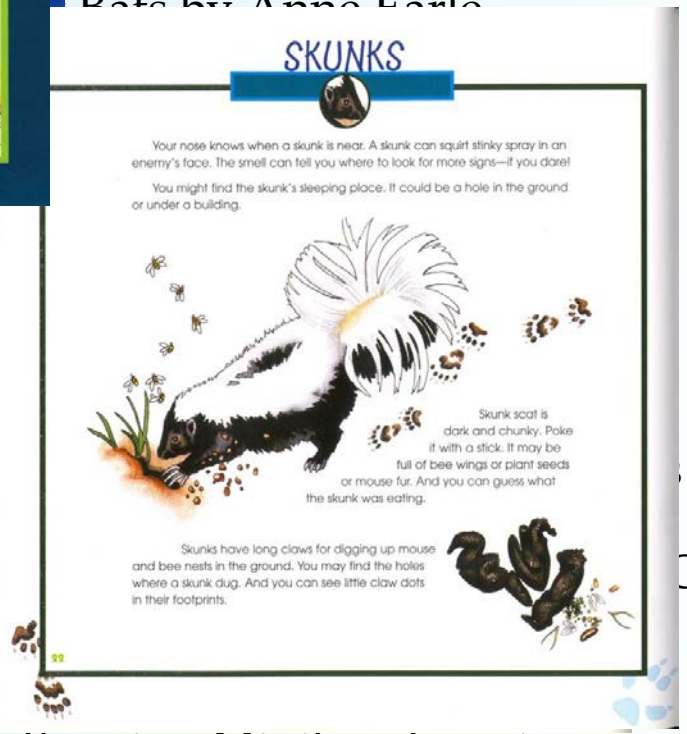
Text & Experience

- Reading for different purposes
- Learning and applying reading strategies across different text genres
- Writing in the genres they are learning



oanne Ryder

Bats by Anne Earle



- Wild Mouse by I
  - Protecting Prima
  - Team moon by C
- Secondhand
  - What Do You Do s and Robin Page
  - Introducing Frog Claire Vial
- Firsthand
  - Tracks, Scats, & Si
  - Snails and Slugs from the Keeping Minibeasts series
  - Take a City Nature Walk

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

Text and Inquiry

		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		

Exposure to Genres of Science Text

	Provide Context	Support Firsthand Investigations	Support Secondhand Investigations	Model	Deliver Content
Procedural		x	x	x	
Biographical	x			x	x
Reference Books		x	x	x	x
Newspaper Articles	x			x	x
Nonfiction Narrative	x	x	x	x	x
Nonfiction Descriptive	x	x	x	x	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