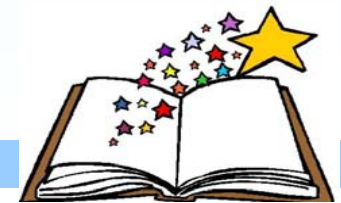


# The Synergies of Literacy and Science

Regional Meeting  
January 2009



# Objectives

- *Discuss the rationale for establishing connections between literacy and content-area instruction.*
- Learn about the natural connections between science inquiry and literacy.
- Explore connections between specific literacy instructional practices and science inquiry instruction.



# Curriculum Frameworks

**“An effective English language arts curriculum develops thinking and language together through interactive learning.”**

*(Massachusetts English Language Arts  
Curriculum Framework: Guiding Principle I, 2001, p. 3)*

**“Effective language use both requires and extends thinking...The standards in this framework specify the intellectual processes that student draw on as they use language...”**

**“...Students develop their ability to remember, understand, analyze, evaluate, and apply the ideas they encounter in the English language arts and in all the other disciplines when they undertake increasingly challenging assignments that require them to write or speak in response to what they are learning.”**



# Curriculum Frameworks

**“An effective science and technology/engineering program builds upon and develops students’ literacy skills and knowledge.”**

*(Massachusetts Science and Technology/Engineering Curriculum Framework: Guiding Principle VI, 2006, p. 15-16)*

**“...Teachers should consistently support students in acquiring comprehension skills and strategies, as well as vocabulary, to deepen students’ understanding of text meaning...”**

**“...Students should be able to use reading, writing, and communication skills to enhance their understanding of scientific and technological/engineering text materials, including informational text, diagrams, charts, graphs, and formulas; communicate ideas; and apply logic and reasoning in scientific and technological/engineering contexts...”**



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# Synergy

- From the Greek *syn-ergo* meaning working together
- Definition: Combined or cooperative action; a term used to describe a situation where the final outcome of system is greater than the sum of its parts

<http://en.wikipedia.org/wiki/Synergy>



# Synergy

Research “suggests that science-literacy integration is a promising path for advancing student learning in both science and literacy.”

Cervetti, G.N., Pearson, D.P., Barber, J.B., Hiebert, E.H., Bravo, M.A., *Integrating literacy and science the research we have, the research we need*



# Integrating Literacy and Science

Carin & Sund (1985), Baker (1991), Padilla, Muth & Lund Padilla (1991), CORI

- Essential literacy skills that are identified in both domains:
  - Drawing/formulating conclusions
  - Making/verifying predictions
  - Classifying
  - Observing
  - Inferring
  - Recognizing main ideas & concepts
  - Activating prior knowledge
  - Summarizing
  - Generating questions



# Literacy-Science Connection

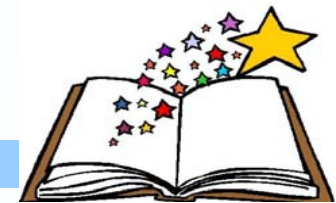
- Reading/Writing are taught and applied as a means to build scientific inquiry
- Vocabulary and word knowledge developed during science inquiry drives literacy development
- Students develop the capacity to engage in informational literacy

Cervetti, G.N., Pearson, D.P., Barber, J.B., Hiebert, E.H., Bravo, M.A., *Integrating literacy and science the research we have, the research we need*



# Objectives

- Discuss the rationale for establishing connections between literacy and content-area instruction.
- Learn about the natural connections between science inquiry and literacy.
- *Explore connections between specific literacy instructional practices and science inquiry instruction.*



# Our Plan

- Use the literacy skills and strategies that we currently teach to support content-area learning.
- Focus on how our approach to vocabulary instruction, comprehension strategies, and communication practices can enhance science inquiry and content knowledge.



# Activity

# *MIT*S



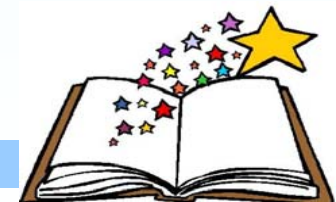
# Our Plan

- Use the literacy skills and strategies that we currently teach to support content-area learning.
- Focus on how our approach to vocabulary instruction, comprehension strategies, and communication practices can enhance science inquiry and content knowledge.



# Making the Connection

- Vocabulary
- Comprehension strategies and informational text
- Communication



# Making the Connection

# *Vocabulary & Content*



# Vocabulary

## General Standard 4: Vocabulary and Concept Development

*Students will understand and acquire new vocabulary and use it correctly in reading and writing*



# Activity

4.3: Identify and sort common words into conceptual categories

# Sort



# *Extensions*

## *4.6: Identify common antonyms and synonyms.*

- Synonyms for water:
  - Rain: shower, drizzle, precipitation, rainwater, rainfall, liquid, fluid
  - Condensation: mist, fog, steam
  - Snow: slush, hail, blizzard, snowflake, freezing rain
- Antonyms for water:
  - Waterless, dry, dried out, dried up, dryness, arid, dehydration



# *Extensions - Idioms with Water*

*4.11: Identify the meaning of common idioms and figurative phrases*

break the ice

storm in a teacup

let of steam

## You Try It!!

in deep water

soaked to the skin

take the plunge

like a fish  
out of water

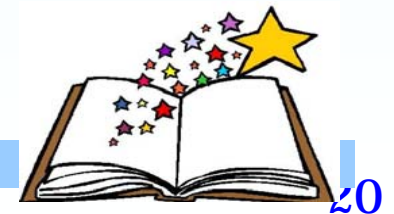
Water under the  
bridge



# *Gradable Antonyms*

*4.3: Identify and sort common words into conceptual categories*

- **Purpose:** Build background knowledge; pre-teach/re-teach vocabulary in an interconnected way
  - Forms of water: ice, snow, slush, rain, dew, mist



# Four-Square Concept Map

4.15: Determine meanings of words and alternate word choices using a dictionary or thesaurus.

Word: <b>Liquid</b>	What are some examples? <i>milk, juice, rain, river, clouds. steam, mist</i>
What is it? <i>A state of matter that is able to flow freely and take the shape of its container.</i>	What is it not like? <i>Ice, snow, JELL-O, popsicle</i>



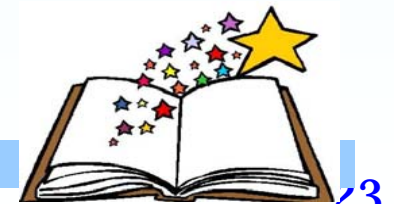
# Making the Connection

## Comprehension Strategies and Informational Text



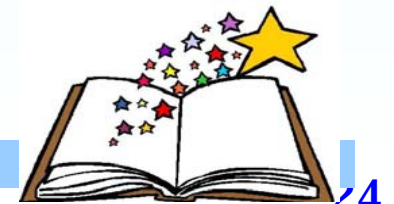
# Standard 24: Research

- 24.1: Generate questions and gather information from several sources in a classroom, school, or public library.
- 24.2: Identify and apply steps in conducting and reporting research:
  - Define the need for information and formulate open-ended research questions.
  - Initiate a plan for searching for information.
  - Locate resources.
  - Evaluate the relevance of the information.
  - Interpret, use, and communicate the information.
  - Evaluate the research project as a whole.



# Activate Prior Knowledge and Build Background Knowledge

- Provide Shared Experience
  - Hands-on activity
  - Realia
  - Read-aloud
  - Prior learning
- **K**-W-L
- Concept Mapping



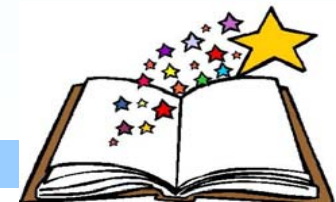
# Establishing Purposes/Goals

- *24.1: Generate questions and gather information from several sources in a classroom, school, or public library.*
- *24.2: Identify and apply steps in conducting and reporting research.*
- **K-W-L**
- Generate questions based on the shared experience



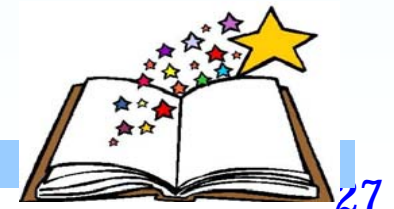
# Searching for Information

- *24.2: Identify and apply steps in conducting and reporting research.*
- *13.1/13.6: Identify and use knowledge of common textual features.*
- Select question(s) to guide the research
- Provide various resources
- Use textual features to locate information



# Interpreting and Using Information

- *13.7: Identify and use knowledge of common graphic features - charts, maps, diagrams, illustrations*
- Using graphic features to understand the information in the text
- Summarize information: K-W-**L**
- Synthesize information: K-W-**L**
- Generate new questions: K-W-L-**W**



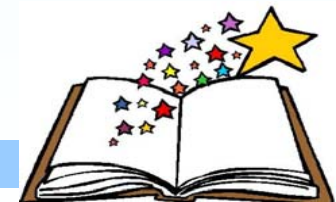
# Making the Connection

## Communication



# Communication

- **ELA Standard 1 (Discussion)**
  - 1.2 Follow agreed-upon rules for class discussion and carry out assigned roles in self-run small group discussions.
  
- **ELA Standard 13 (Nonfiction)**
  - 13.7 Identify and use knowledge of common graphic features (charts, maps, diagrams, illustrations).

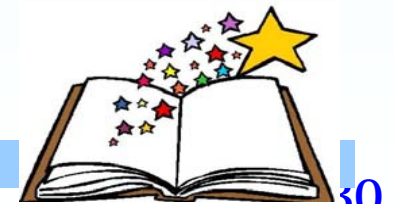


# Communication Example #1

- **ELA Standard 1 (Discussion)**
  - 1.2 Follow agreed-upon rules for class discussion and carry out assigned roles in self-run small group discussions.
- **Skills of Inquiry, Experimentation, and Design**

*(Massachusetts Science and Technology/Engineering Curriculum Framework, 2006, p. 11)*

  - Tell about *why and what would happen if?*
  - Discuss observations with others.



# Communication Example #2

- **ELA Standard 13 (Nonfiction)**
  - 13.7 Identify and use knowledge of common graphic features (charts, maps, diagrams, illustrations).
- **Skills of Inquiry, Experimentation, and Design**  
*(Massachusetts Science and Technology/Engineering Curriculum Framework, 2006, p. 11)*
  - Record data and communicate findings to others using graphs, charts, maps, models, and oral and written reports.



# References

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- Michaels, S., Shouse, A.W., Schweingruber, H.A. (2008). *Ready, set, science: Putting research to work in K-8 science classrooms*. The National Academies Press: Washington, D.C.

