





**Innovative Science and Literacy Integration:  
Seeds of Science/Roots of Reading  
Variation and Adaptation Unit**





Jonathan Curley and Carrie Strohl  
Lawrence Hall of Science

National Science Teachers Association  
National Conference  
Philadelphia, PA  
March 18, 2010



a curriculum development *and* research project

### Goals:

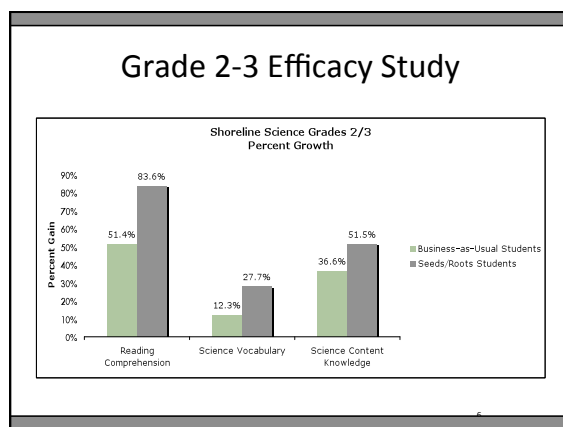
- Introduce an integrated science and literacy program
- Demonstrate our approach using activities from one unit
- Share research results demonstrating program effectiveness
- Preview program components and features

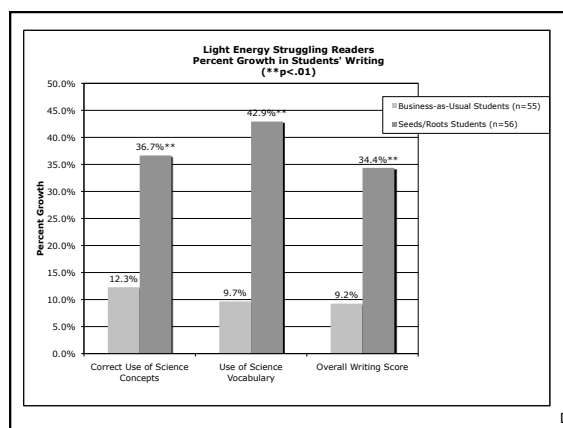
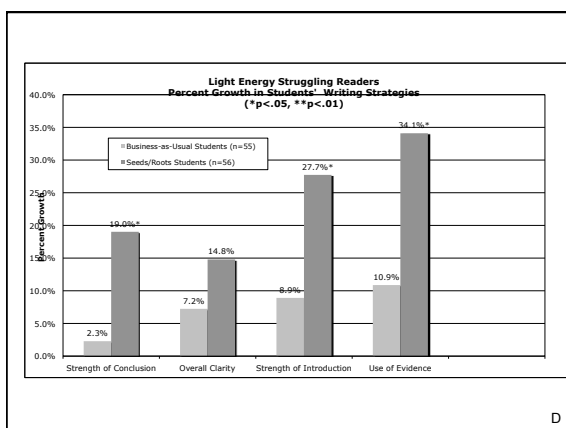
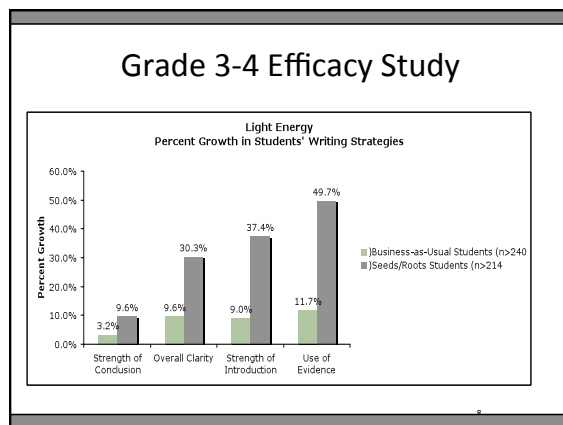
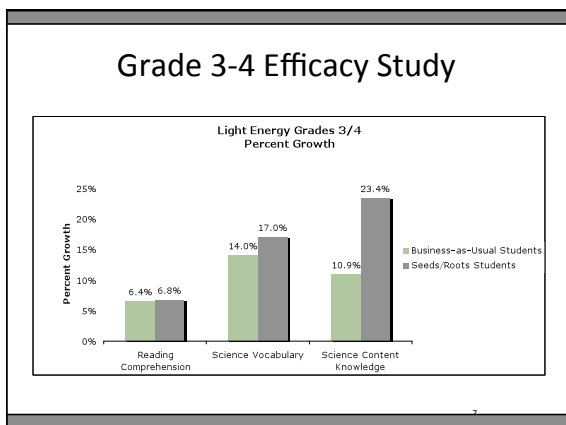
### Benefits to Integration

- Limits to learning solely from text or experience
- Reading and writing are best learned in the context of a content area
- Reading and writing are authentic to inquiry science
- Pressures of the congested curriculum: no time for science
- Increasing evidence of mutual benefit to students

### What's our evidence?

- Field Testing Nationwide
- Efficacy Studies
- Conducted by an independent evaluator (CRESST at UCLA)
- Evaluated units at grades 2-3, 3-4 and 4-5
- Examined Seeds/Roots students and comparison classes on measures of:
  - Science knowledge
  - Vocabulary
  - Science writing
  - Reading comprehension





- ### Encouraging Results!
- Struggling students
    - Equivalent gains for students who started out with lower scores (Grade 2-3 study)
  - English language learners
    - ELLs in Seeds/Roots classrooms made greater gains than ELLs in comparison classrooms (Grade 4-5 study, subset of classrooms with high percentage ELLs)

### 2nd-5th Grade Scope and Sequence

	Life Science	Earth Science	Physical Science
<b>Grades 2-3</b>	Soil Habitats	Shoreline Science	Designing Mixtures Gravity and Magnetism
<b>Grades 3-4</b>	Digestion and Body Systems Variation and Adaptation	Weather and Water	Light Energy
<b>Grades 4-5</b>	Aquatic Ecosystems	Planets and Moons	Models of Matter Chemical Changes

Focus for Today

**Variation and Adaptation Overview Chart**  
Investigation 1: Comparing Living Things

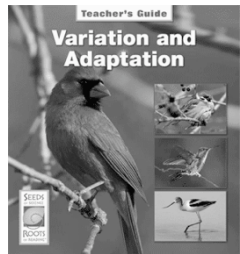
SESSION 1.1	SESSION 1.2	SESSION 1.3	SESSION 1.4	SESSION 1.5
Evidence of Relatedness				
SESSION 1.6	SESSION 1.7	SESSION 1.8	SESSION 1.9	SESSION 1.10
Heredity				

Investigation 2: Evidence of Adaptation

SESSION 2.1	SESSION 2.2	SESSION 2.3	SESSION 2.4	SESSION 2.5
Adaptations for Survival				
SESSION 2.6	SESSION 2.7	SESSION 2.8	SESSION 2.9	SESSION 2.10
Fossil Record as Evidence				

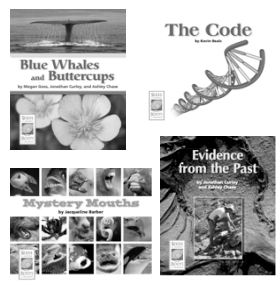
### Unit Goals: Science

- Content Knowledge
  - variation and relatedness of organisms
  - adaptation
  - heredity
  - fossil record as evidence
- Inquiry
- Nature and Practices of Science




### Unit Goals: Literacy

- Reading Comprehension
  - making inferences
- Writing
  - Scientific comparisons
- Listening/ Speaking
  - Vocabulary
  - Language of Science



### Engaging Students Through Text and Experience



### Text and Experience

What did you get from reading *Blue Whales and Buttercups* that you couldn't get from observing bird sounds?

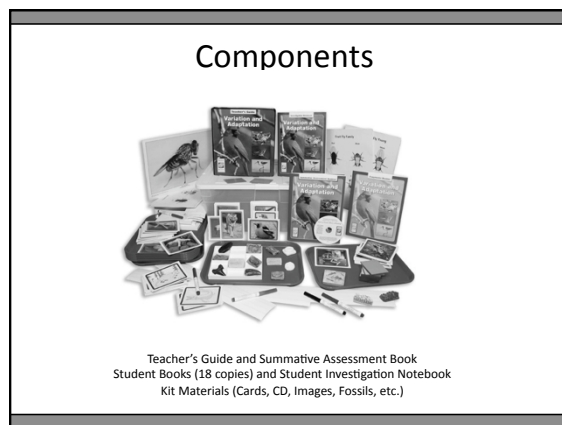
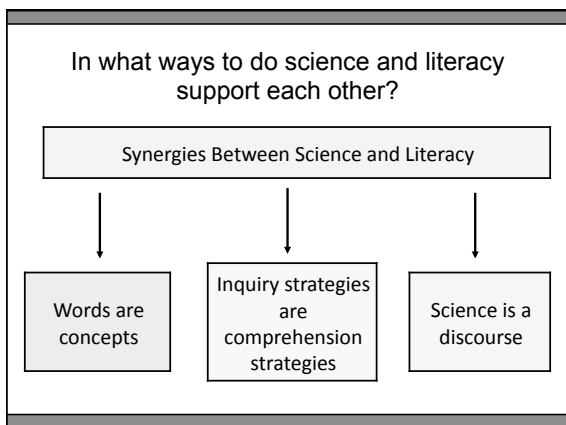
What did you learn from observing bird sounds, that you couldn't get from reading *Blue Whales and Buttercups*?

### Text and Experience

Text ↔ Experience

Engage students in firsthand and secondhand investigation to make sense of the natural world.





### Want to learn more?

[www.seedsofscience.org](http://www.seedsofscience.org)

This material is based upon work supported by the National Science Foundation under Grant #s ESI-0242733, 0628272 and 0822119.