Virtual Courseware Project ScienceCourseware.org

Virtual Courseware for Inquiry-based Earth Science Education

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Project Philosophy

Students Learn by Doing!

"Virtual Courseware" activities are interactive simulations that emphasize the scientific method: making observations, proposing hypotheses, designing experiments, collecting and analyzing data, synthesizing results.

5 Essential Features of Inquiry

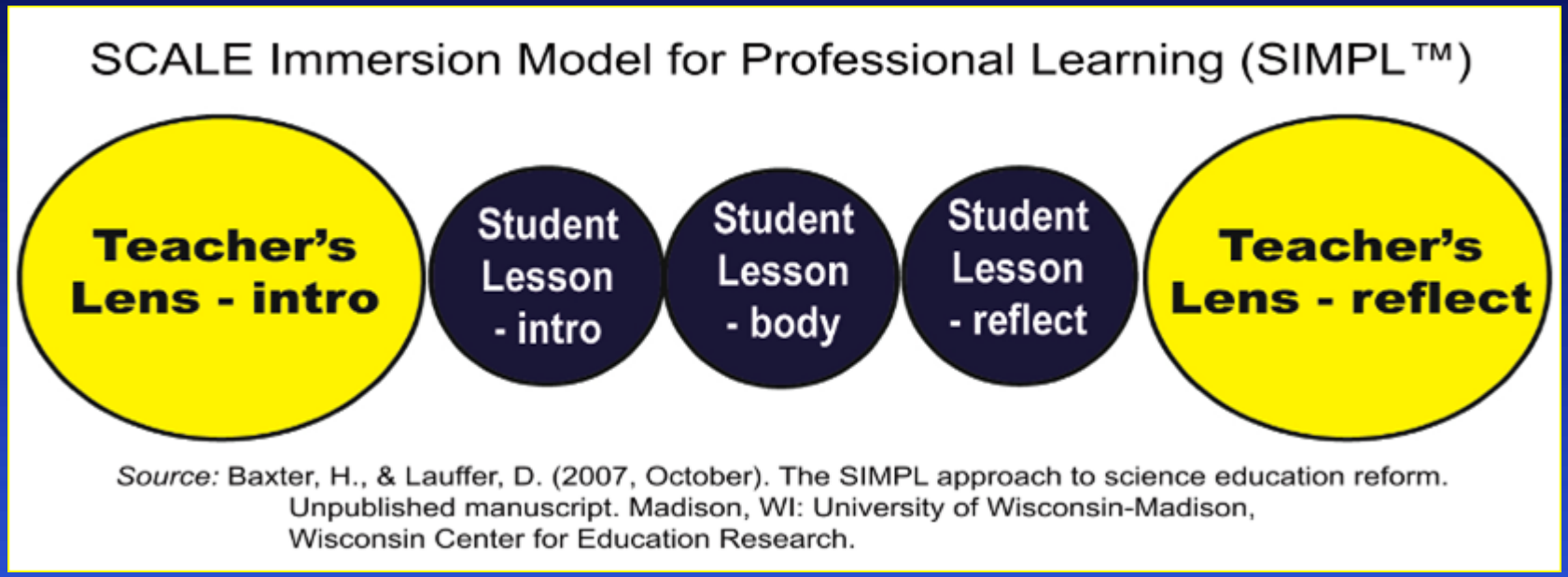
- *Inquiry and the National Science Education Standards*, describes five essential features of inquiry – five characteristics that define this way of understanding the natural world (National Research Council, 2000).
- These five essential features can be used to describe the process by which science inquiry takes shape in the classroom or in the "virtual world."

5 Essential Features of Inquiry

- The learner:

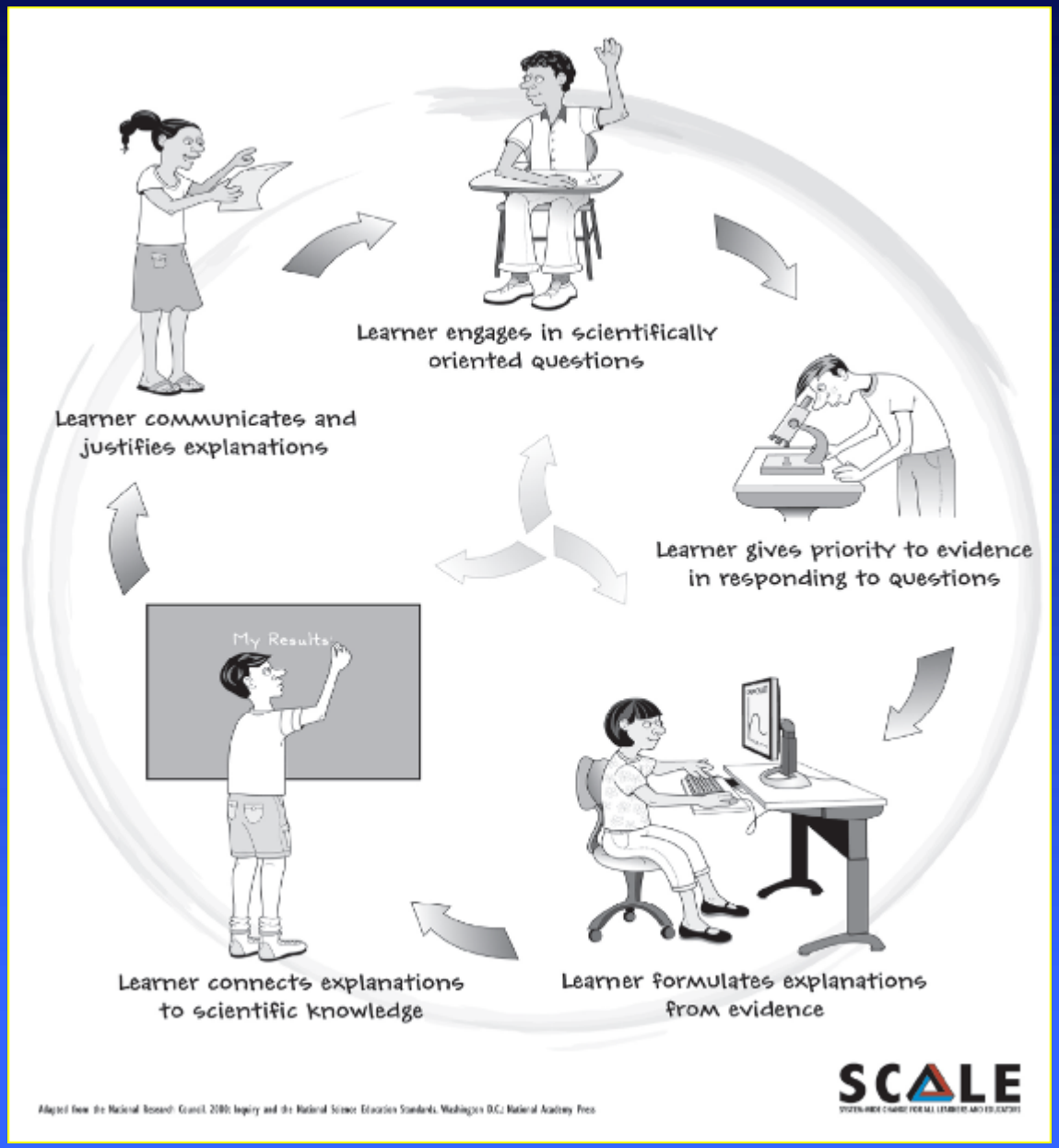
1. Engages in scientifically oriented questions;
2. Gives priority to evidence in responding to questions;
3. Formulates explanations from evidence;
4. Connects explanations to scientific knowledge; and
5. Communicates and justifies explanations.

SCALE Immersion Professional Learning Model (SIMPL™)



Source: Baxter, H., & Lauffer, D. (2007, October). The SIMPL approach to science education reform. Unpublished manuscript. Madison, WI: University of Wisconsin-Madison, Wisconsin Center for Education Research.

- Based on the Engage → Explore → Explain learning paradigm, aligned with the research summarized in *How People Learn*
- Modeling the way and applying learning research to experiences for adult learners


Learner engages in scientifically oriented questions
Learner gives priority to evidence in responding to questions
Learner formulates explanations from evidence
Learner connects explanations to scientific knowledge
Learner communicates and justifies explanations
My Results
SCALE

What is Inquiry?

- *Inquiry and the National Science Education Standards: A Guide for Teaching for Teaching and Learning*, defines scientific inquiry as:

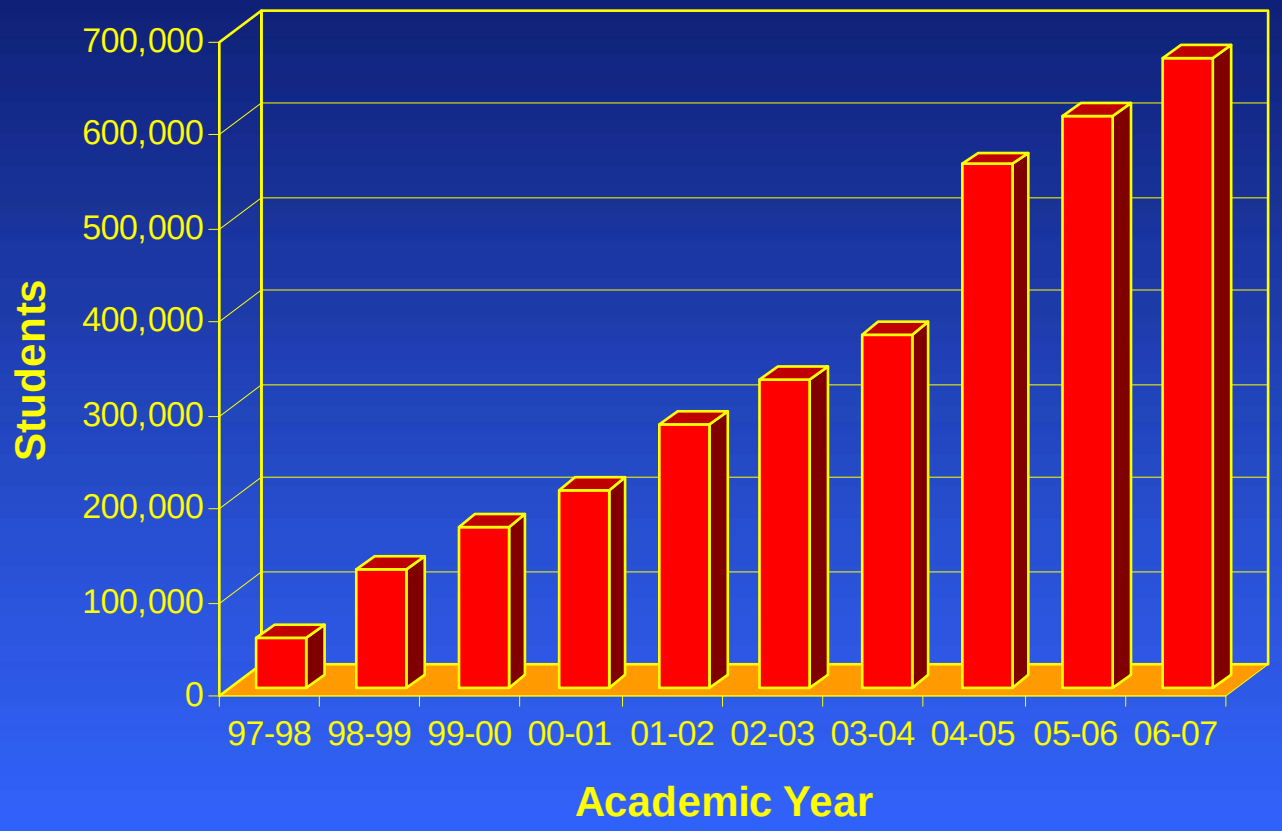
- *A multifaceted activity that involves observations; posing questions; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze and interpret data; proposing answers, explanations and predictions; and communicating the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative [scientific] explanations* (National Research Council 2000, p. 13).

- Enhancing mastery of subject matter;
- Developing scientific reasoning;
- Understanding the complexity and ambiguity of empirical work;
- Developing practical skills;
- Understanding the nature of science;
- Cultivating interest in science and interest in learning science; and
- Developing teamwork abilities.

Project History

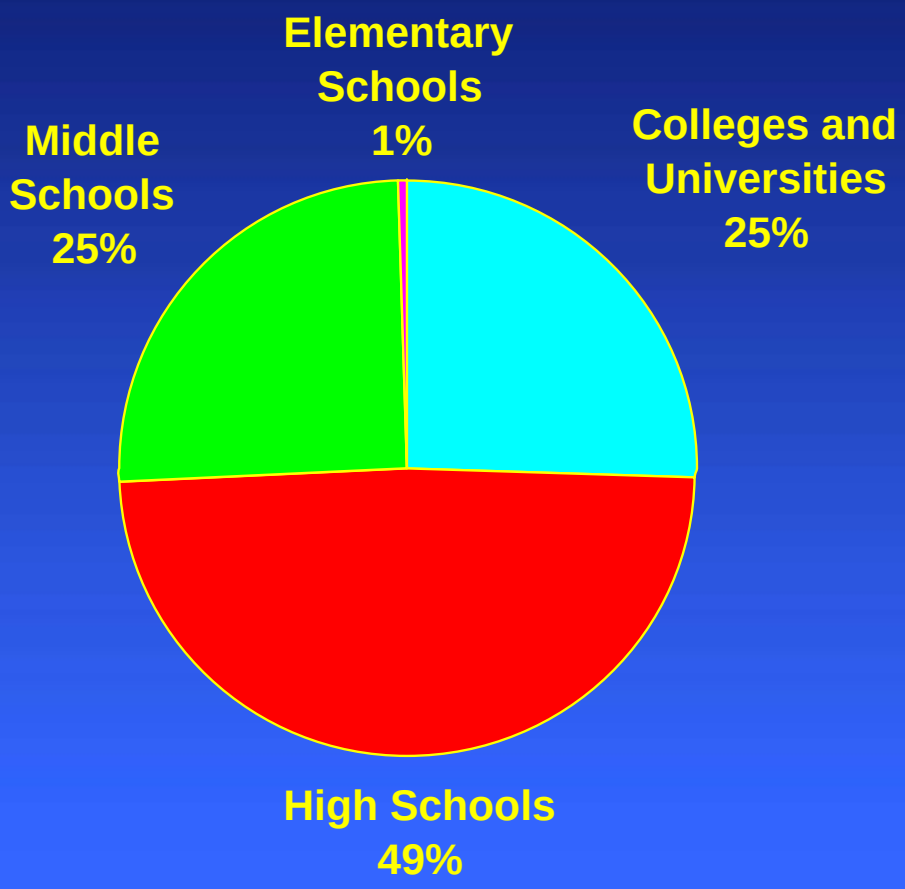
- *Virtual FlyLab* (1995)
- *Virtual Earthquake* (1996)
- *Biology Labs On-Line* (1999 –2002)
- *Geology Labs On-Line* (1999–2001)
- New *Earthquake* Activity (2000–2003)
- Global Warming Suite (2002 –2005)
- VCISE (2004 – present)

Virtual Courseware Usage



In addition, over 650,000 annual subscriptions to Biology Labs On-Line applets have been sold.

Users of Virtual Courseware



Current Project: *VCISE*

In March of 2004 Cal State LA was awarded an Instructional Materials Development grant from the NSF Division of Elementary, Secondary, and Informal Education.

Project Goals:

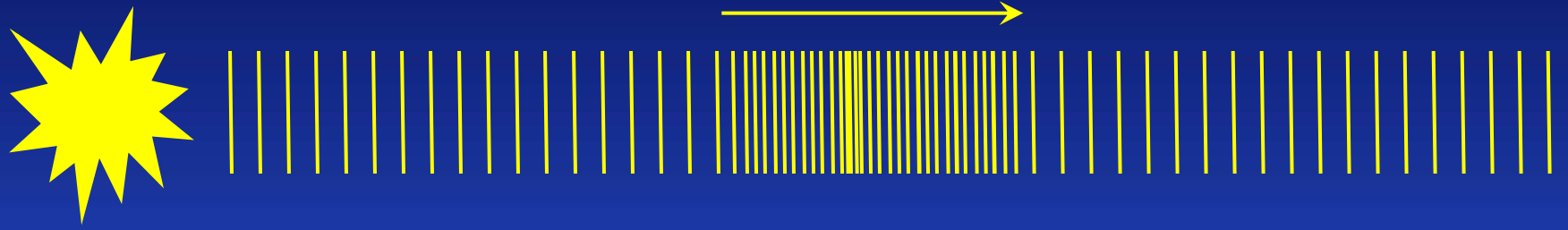
- develop and evaluate on-line instructional materials for secondary students in biology and earth science
- align the activities to both state and National Science Education Standards
- support science teachers in their efforts to implement inquiry based learning activities in their classrooms
- disseminate materials as widely as possible

http://www.ScienceCourseware.org/

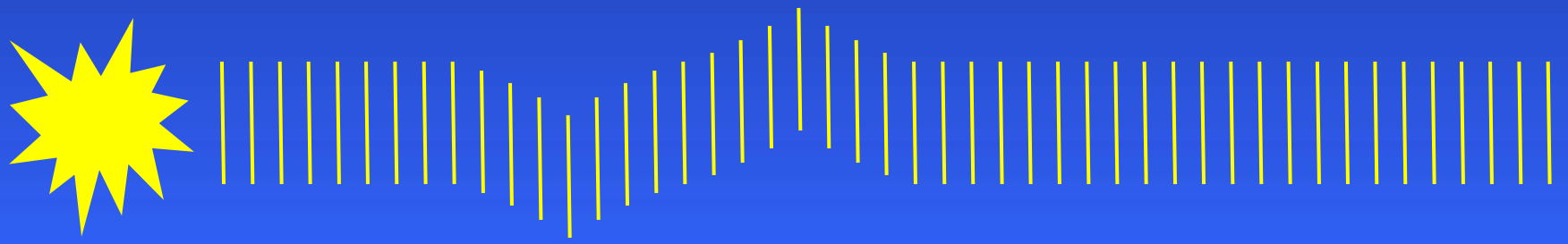
Go to Earth & Environmental Sciences.

Click on Earthquake.

Compression Waves

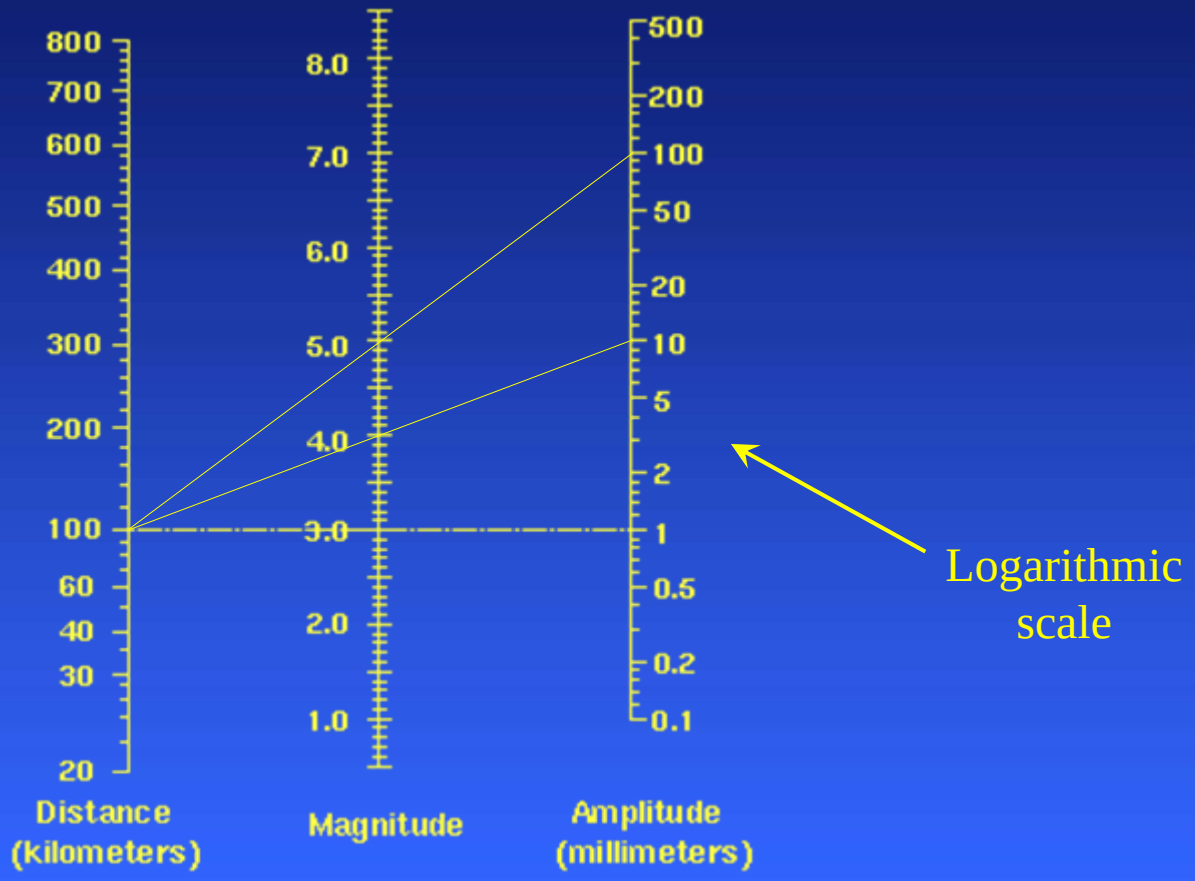


Shear Waves



Compression waves travel faster than shear waves.

Richter's Nomogram



Converts distance and amplitude into Richter magnitude.

http://dev.ScienceCourseware.org/

User name: teched
Password: conference

Go to Virtual Courseware for Inquiry-based Science Education.

Click on Relative Dating.

Relative Dating of Geological Events

Principles:

- *Superposition:* the older rock layers are on the bottom, and the younger rock layers are on the top
- *Original Horizontality:* sediments are deposited in flat, horizontal layers
- *Intrusive Relationships:* the intrusion is younger than the rocks it cuts.
- *Cross-Cutting Relationships:* the fault is younger than the rocks it cuts

Virtual Courseware Project

ScienceCourseware.org