

# Digital Library Evaluation

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# Evaluation of Digital Libraries Outline

- What is evaluation of digital libraries?
- Different models
- Evaluation cycle
- What to evaluate?
- How to evaluate?
- Good practice

# What is evaluation of digital libraries?

- Evaluation is a fact finding, evidence based value measuring, integrated in the management process of digital libraries

# What is the purpose of evaluation of digital libraries?

- Accountability: evidence of resources spent
- Effectiveness: understanding basic phenomena (information seeking)
- Impact: increased learning, research, dissemination

# Outcomes assessment

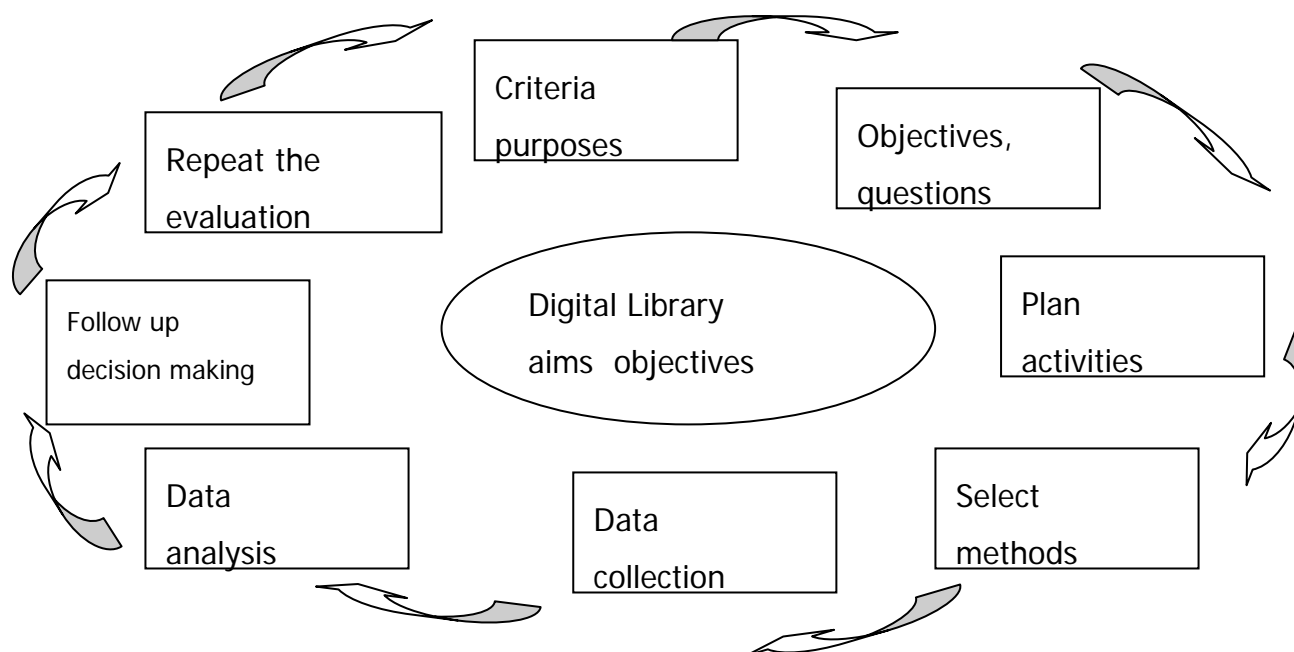
The ways in which library users are changed as a result of their contact with the library resources and programs (ARL 1998)

The ultimate question for evaluation is:

“How are digital libraries transforming research, education, learning and living?”

(Saracevic 2002, p. 368)

# Evaluation planning cycle



# What can be evaluated?

- Content
- Services/system
- Users and uses

# Content centered evaluation

- Content quality (subject coverage, relevance)
- Content scope (what is included? online journals, ebook)
- Content organisation (bibliographic organisation, indexing)
- Effectiveness (management, user support)
- Efficiency (cost)



# System centered evaluation

- Content interface (design, navigation support)
- System performance (interactivity, algorithms for searching, processing time)
- System configuration (networks, security, authentication)

# User centered evaluation

- Who are they? (researchers, students, remote, etc.? What is their context?)
- How do they access the digital library? (information seeking behaviour, usability)
- Why do they need the digital library? (activities, expectations)
- What type of resources do they need? (subject, etc.)
- What is the value of digital library? (impact, outcomes, potential for community building)

# How to evaluate?

- Survey
- Focus group
- Interviews
- Transaction logs
- Observation
- Ethnographic evaluation
- Usability
- Combined methods
- Longitudinal studies
- Crosscultural assessment
- Benchmarking

# International collaboration on evaluation of digital libraries

- Standard approach
  - COUNTER, SUSHI (NISO standard usage statistics harvesting initiative)
- No benchmarking or longitudinal studies (for the rate of change)

# Good practice

- DigiQual
  - <http://www.digiqua1.org/>
- PEAK
  - <http://www.dlib.org/dlib/june99/06bonn.html>
- E-valued
  - <http://www.evalued.uce.ac.uk>

## Further readings

- Tefko Saracevic, Kantor, P. (1997). Studying the value of library and information services. I. Establishing a theoretical framework. II. Methodology and Taxonomy. *Journal of the American Society for Information Science*, 48 (6), 527-542, 543-563.
- Tefko Saracevic, 2000. "Digital library evaluation: Toward an evolution of concepts," *Library Trends*, volume 49, number 2 (Fall), pp. 350–369
- Marchionini, G.; Plaisant, C.; & Komlodi, A. (199...) The people in digital libraries: Multifaceted approaches to assessing needs and impact. Chapter in Bishop, A. Battenfield, B. & VanHouse, N. (Eds.) *Digital library use: Social practice in design and evaluation*. MIT Press. (<http://ils.unc.edu/~march/revision.pdf>)

# To further complicate things....

- Paolo Galluzzi
  - Contextualized information
  - Community of contributors
  - Responsibility for stewardship
- Vittore Casarosa
  - Framework for DL
- Kaye Howe
  - Educational impact and DLs as cognitive tools
- Pat Dixon
  - Project management

## To further complicate things...

- Dean Krafft, Donna Castelli, David Millman
  - Technical approaches
- Paul Weston
  - Metadata practices
- Sandy Payette
  - Architecture to support evolving user needs
- John Akeroyd
  - e-Learning

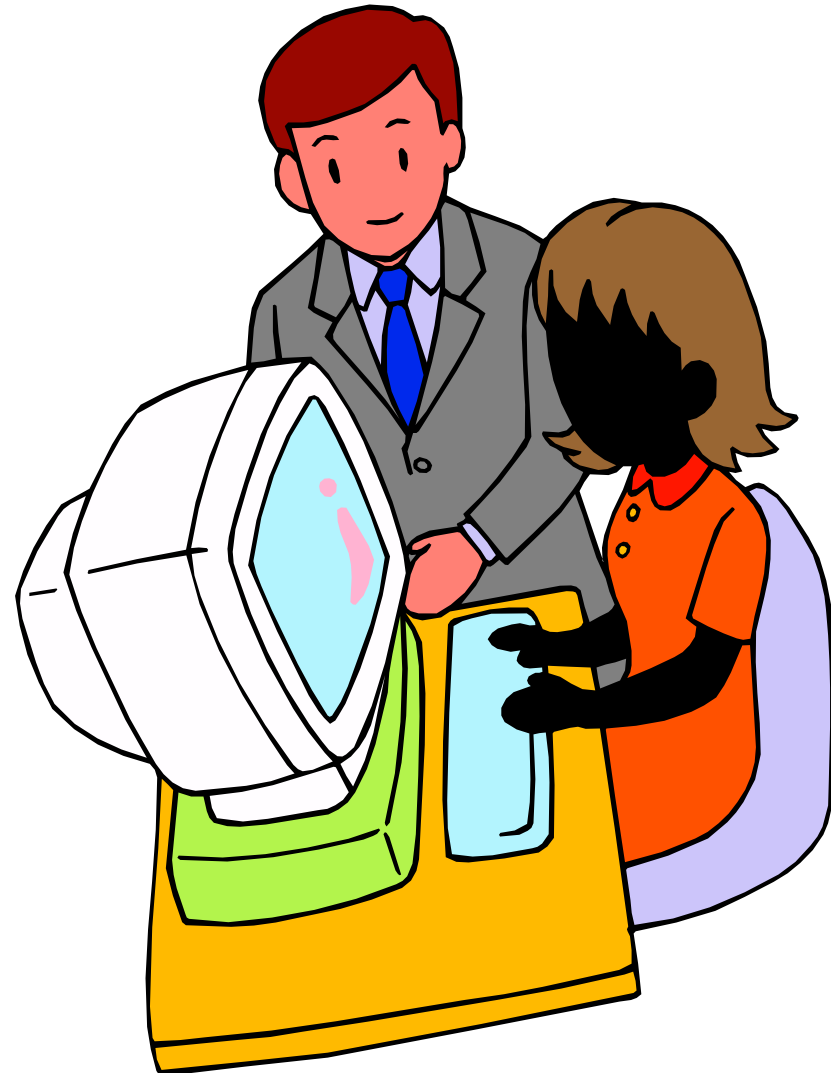


# Practical strategies (and pitfalls)

- Keep description as a primary goal
- Embrace complexity; resist the temptation to oversimplify
- Render judgment carefully
  - description preserves complexity
  - judgment forces decisions of acceptance or rejection
  - (e.g., ACTLS, Apple)

# 4 Major Questions for Evaluation

- What actually occurred?
- How can it be improved?
- Did it accomplish the objectives?
- What impact did it have?



# Four Facets of Evaluation Model

- What actually occurred?
- How can it be improved?
- Did it accomplish its objectives?
- What impact did it have?



Documentation  
Evaluation



Formative  
Evaluation



Effectiveness  
Evaluation



Impact  
Evaluation

# Practical strategies (and pitfalls)

- Understand the impact of multiple publics
  - Evaluating is essentially a political activity
    - [www.globalwarming.org](http://www.globalwarming.org)

## Bad News

There is no single, easy to administer, inexpensive, reliable, and valid approach to evaluating interactive learning from DLs.



## Good News

There are practical strategies for documenting the development and use of interactive learning, improving it, and building a case for its effectiveness and impact.

Thank goodness!



## And finally...

- Evaluation doesn't "prove" anything!
  - People, not data, make decisions
    - evidence is the source of deliberation, but ultimately, you are responsible for the impact of your decisions

# DLESE as a case study

- Ongoing evaluation over 7 year period
  - User-centered design process
  - Collections
  - Operations
  - Users
  - Community Input
  - Contextualization Services



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

# User-Centered Design

**DLESE** Educational Resources For Educators News & Opportunities People & Groups For Developers About DLESE

Digital Library for Earth System Education Funded by the National Science Foundation

**Getting started with DLESE**

**Search**

plate tectonics

**Browse**

Select / Clear all

- ☐ Primary (K-2)
- ☐ Intermediate (3-5)
- ☒ Middle (6-8)
- ☐ High (9-12)
- ☐ College (13-14)
- ☐ College (15-16)
- ☐ Graduate / Professional
- ☐ Informal
- ☐ General public

**Resource of interest** [<< Previous](#) | [Next >>](#)

**Earth Science Week: Be a Citizen Scientist**

*Celebrate EARTH SCIENCE WEEK OCTOBER 8-14, 2006*

Each year, [Earth Science Week](#) focuses on a different facet of earth science to help people gain a better understanding and appreciation of the natural world. This site describes how classrooms can integrate Earth Science Week into their curriculum including ways to involve the community, contests, and grade-level appropriate activities.

This year's theme is "Be a citizen scientist". What does it mean to be a citizen scientist? Real people collecting data, observing, and testing. A citizen scientist is YOU involved in real science and research! Find more ideas about how you and others can become scientifically literate citizens and get involved in Earth Science Week 2006.

[Teaching Tip from Intermediate Elementary Teacher](#)  
Posted October 2006

[Suggest](#) an interesting Earth system site.  
[View or subscribe](#) to all resources of interest

A free service for learners of all ages

FAQ | [Site map](#) | [Privacy](#) | [Terms of use](#) | [Contact us](#)

NSDL

## Discovering Plate Boundaries

<http://terra.rice.edu/plateboundary/index.html>

[Submit a review](#)

[Submit a comment or teaching tip](#)

Discovering **Plate** Boundaries is based on 5 world maps containing earthquake, volcano, topography, satellite gravity, and seafloor age data. The novel aspect of the exercise is the "jigsaw" manner in which student groups access the maps and use them to discover, classify, and describe **plate** boundary types. The exercise is based only on observation and description, which makes it useful at a wide variety ... [Full description](#).

*Grade level:* Middle (6-8), High (9-12), College (13-14), College (15-16)

*Resource Type:* Classroom activity, Map, In-situ dataset, Modeled dataset, Remotely sensed dataset

*Subject:* Physical geography, Geologic time, Geology, Geophysics, Structural geology, Natural hazards

### ☒ CHOOSING & USING this resource...

#### Educational standards associated with this resource:

National Science Education Standards (NSES): [Read](#)

#### Teaching Tips and Comments

[Read](#)

#### Reviews

General reviews: [Read](#)

Meeting special needs: [Read](#)

Summaries: [Read](#)

Scores: [Read](#)


#### Related resources and collections

*This resource contains:*

[Downloads Page](#) - <http://terra.rice.edu/plateboundary/downloads.html>

*This resource is included in the following collections:*

DLESE Community Collection (DCC) [Browse collection](#)

DLESE Reviewed Collection (DRC)  [Browse collection](#)

Community Annotated Collection [Browse collection](#)



[Educational Resources](#)[For Educators](#)[News & Opportunities](#)[People & Groups](#)[For Developers](#)[About DLESE](#)

COMMUNITY

REVIEW

SYSTEM

[Read Reviews and Comments](#)

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**Annotation: Comments and Teaching Tips**

Title: [Discovering Plate Boundaries](#)  
ID: DLESE-000-000-001-762

Number of Comments and Teaching Tips: 18

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From a contributor on **2006-08-14** who identified as a(n) **Teacher:Undergrad\_lower\_division**, teaching a course titled **"Physical Geology"**:

It might help to have the Plate Boundaries map printed out to the same size as the students' speciality maps - so they can overlay the plate boundaries directly over the speciality maps (by holding both together up to the light, for instance) and to aid in locating the boundaries on the speciality maps. Great exercise!

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From a contributor on **2006-03-15** who identified as a(n) **Teacher:High\_school**, teaching a course titled **"Physical Setting Earth Science"**:

For this lesson to work effectively it helps to have the students practice observing and describing.

## ■ Collections

Find a  
Resource

plate tectonics



Resources



News

Search

Grade Level ▼

Resource Type ▼

Collections ▼

Standards ▼

Clear selections

Tips

Your selections: Grades: 6-8

Have a second? Please tell  
us why you're here today ▼

Educational resources &gt; Find a resource

## Results 1 - 10 of 327 for 'plate tectonics'

1 2 3 4 5 &gt;&gt;

## Plate Tectonics

[Submit a comment or teaching tip](#)[http://volcano.und.nodak.edu/vwdocs/vwlessons/plate\\_tectonics/introduction.html](http://volcano.und.nodak.edu/vwdocs/vwlessons/plate_tectonics/introduction.html)


This lesson about the theory of **plate tectonics** begins with a description of the chemical and physical layers of the Earth featuring text and scientific illustrations. It then discusses the historical development of the **plate** tectonic theory, and concludes with descriptions of the locations and types of **plate** boundaries. Students will learn the three layers of the Earth, observations that support ... [Full description](#).

*Grade level:* Middle (6-8), High (9-12)*Resource Type:* Tutorial, Illustration - scientific*Subject:* Geology, Geophysics CHOOSING & USING this resource...

## Plate Tectonics

[Submit a comment or teaching tip](#)<http://zebu.uoregon.edu/1996/ph123/l13a.html>

This site provides an introduction to **plate tectonics** using color maps and text descriptions. Links are also provided for maps of recent earthquakes in the western United States, the world and in the Los Angeles area. [Full description](#).

*Grade level:* Middle (6-8), High (9-12)*Resource Type:* Tutorial, Imagery - remotely sensed, Map*Subject:* Geology, Geophysics CHOOSING & USING this resource...

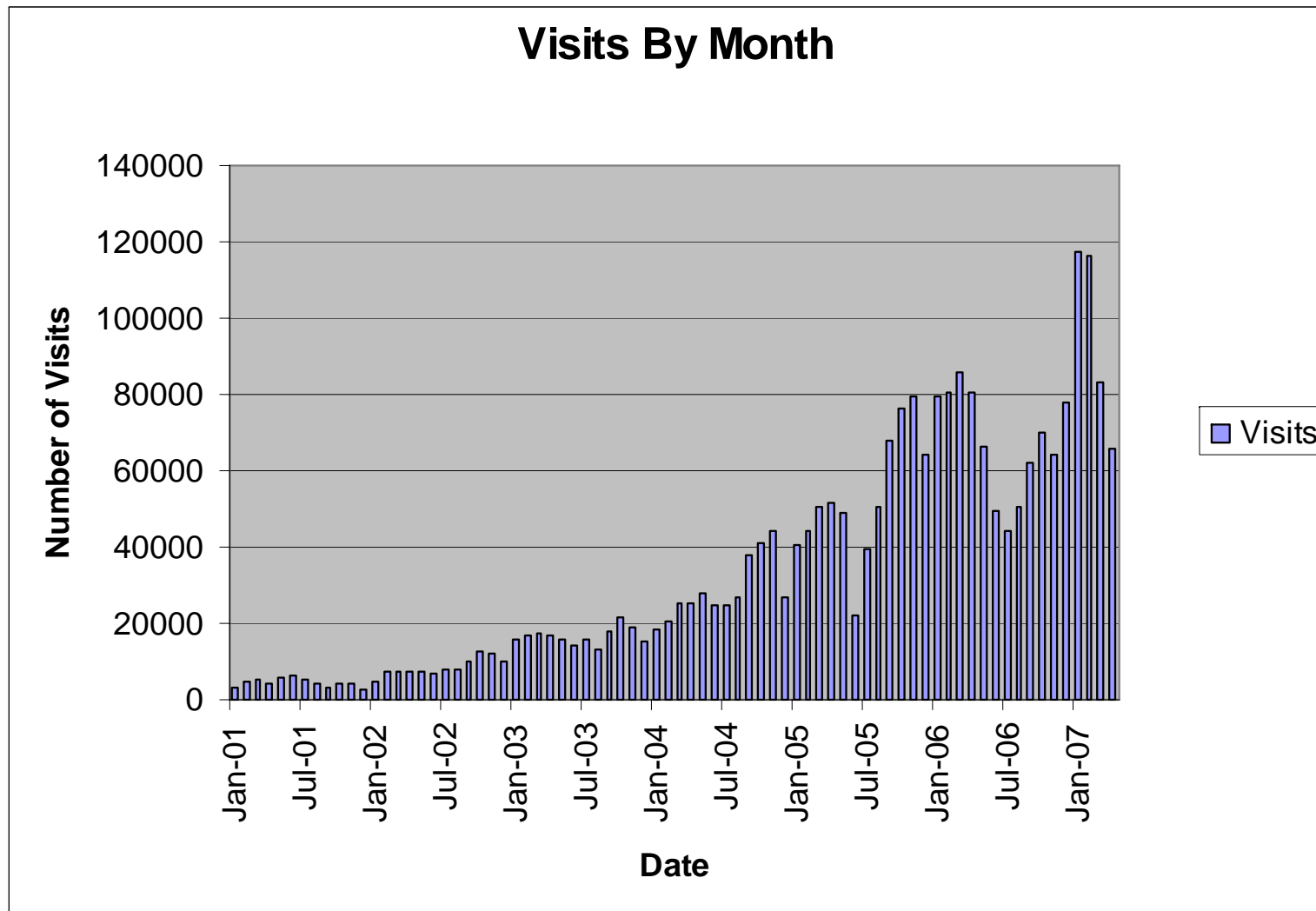
## Plate Tectonics: A Continuous Process

[Submit a comment or teaching tip](#)<http://library.thinkquest.org/17701/high/tectonics/>

This page provides an introduction to **plate tectonics** for secondary students. Topics include **plate** motions, the layers of the Earth and oceanic versus continental plates. A set of links provides access to material on the processes of **plate tectonics** occurring at **plate** boundaries, zones of movement and instability. [Full description](#).

- Ongoing
  - Documentation of technical components and maintenance processes
  - Link checking
  - Metrics collection (quality of service and usage)
    - 99.6% uptime over 9 months (24 hours 43 minutes downtime)
    - Prior to reduction in staff: 99.9% over 12 month period

# Users: Metrics





# Users: ongoing studies

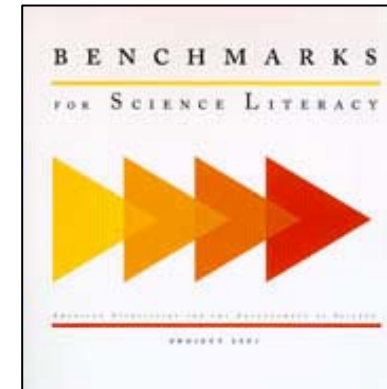
- Usability studies
- Task-orientated studies
  - Google users unable to complete any task in allotted time; DLESE users completed all tasks, even novices
- Pop-up survey
  - 98% express satisfaction
  - (what about users who don't bother to respond?)
- Support @ dlese
  - Addresses common questions and concerns

- Resources contributed
  - 12% of total collection (14,000) comprised of individual resources contributed by community
  - 88% of collection contributed by primarily NSF-funded grants
- Annotations and reviews contributed
  - 5000



# Contextualization Services: AAAS Benchmarks and Strand Maps

- **Benchmarks:** Describe what learners should know, or be able to do, at key stages in their education across the STEM disciplines
- **Strand maps:** Node-link diagrams illustrating how student understanding changes over time



# What is a Benchmark?

**3-5**

When warmer things are put with cooler ones, the warm ones lose heat and the cool ones gain it until they are all the same temperature.

Research on the cognitive and scientific basis

Research on student (mis-)conceptions

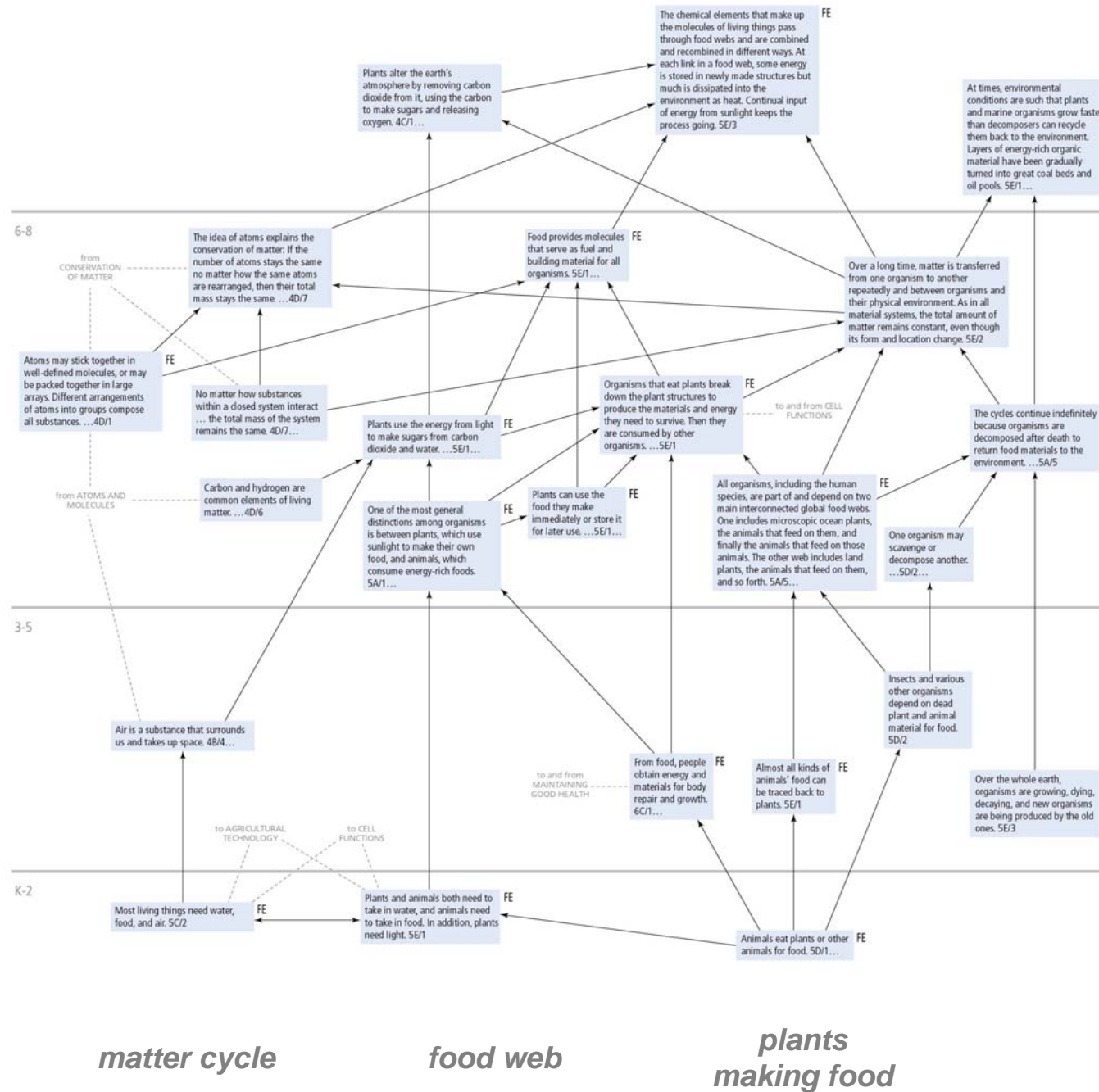
Strategies to check student understanding

Assessment activities

**K-2**


The sun warms the air, land and water.

# Flow of Matter in Ecosystems Map



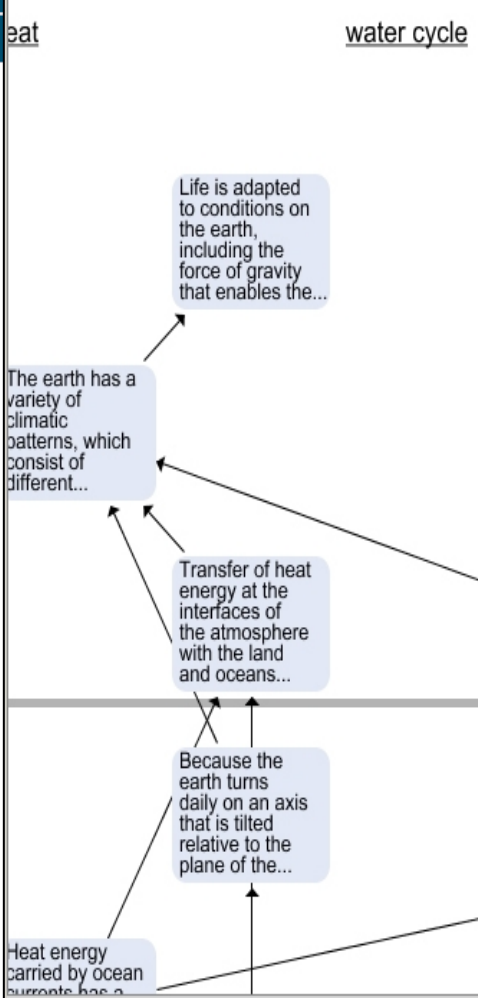
# Strand Map Service in DLESE




**NSDL** Concept Maps for Science and Mathematics Education  
 Helping teachers connect concepts, standards and NSDL educational resources

Select Topic   OR Show concept maps about

Current Map: Weather and Climate



**heat**

**water cycle**

**climate change**

Life is adapted to conditions on the earth, including the force of gravity that enables the...

The earth has a variety of climatic patterns, which consist of different...

Transfer of heat energy at the interfaces of the atmosphere with the land and oceans...

Because the earth turns daily on an axis that is tilted relative to the plane of the...

Heat energy carried by ocean currents has a...

Human activities, such as reducing the...

Gas and dust from large volcanoes

**Gas and dust from large volcanoes**

**AAAS Benchmark:** The interior of the earth is hot. Heat flow and movement of material within the earth cause earthquakes and volcanic eruptions and create mountains and ocean basins. Gas and dust from large volcanoes can change the atmosphere.

Grade range: 6 - 8  
Topic areas: atmosphere | climate change

[View Standards](#)

**All Resources** **Related Benchmarks**

**All Resources**  
results 1 - 5 out of 1626 [Next >>](#)

**Explore the Deep Oceans**  
[http://www.amnh.org/education/resources/rfl/pdf/dsv\\_u01\\_explore.pdf](http://www.amnh.org/education/resources/rfl/pdf/dsv_u01_explore.pdf)  
Following an expedition off the coast of Washington State, this six-day unit provides an in-depth look at deep sea vents. Throughout the unit, students collect their findings in a portfolio. The comprehensive curriculum materials include: Teacher tools, which include individually downloadable readings, ...

**Gottesman Hall of Planet Earth: Middle and High School Educator's Guide Inserts**  
[http://www.amnh.org/education/resources/rfl/pdf/hope\\_high\\_inserts.pdf](http://www.amnh.org/education/resources/rfl/pdf/hope_high_inserts.pdf)  
This activity is designed to be completed during a visit to the Museum's Gottesman Hall of Planet Earth. The printable handout has Student Field Journal pages, to be completed by middle and high school students. Eight student teams work to answer questions, which include: How Has the Earth Evolved? ...

**Dispatch from the Deep: Shaping the Ocean Floor at the Mid-Ocean Ridges**  
[http://www.amnh.org/education/resources/rfl/web/dsv/ocean\\_floor.html](http://www.amnh.org/education/resources/rfl/web/dsv/ocean_floor.html)  
This three-page dispatch reports on a science teacher's experiences when she joined a research expedition to study deep sea vents in the Pacific Ocean. It offers an engaging and informative overview of the following topics: The peaks, valleys, and plains that form the ocean's floor. The internal ...

# Strand Map Service in NSDL.org

# Outcomes of this Service Effort

- Evaluation results – *a useful cognitive tool*
  - Controlled study examined influence of interface on cognitive processes of undergraduates
  - Compared visual interface and keyword-based interface
  - Students focused on science content, twice as much using visual interface, as opposed to query construction and surface features

Butcher, K, S. Bhushan, and T. Sumner (2006). "Multimedia displays for conceptual search processes: Information seeking with strand maps." ACM Multimedia Systems Journal (Special issue on Multimedia in Education and eLearning), Vol. 11, No. 3, 236-248

- Supports internationally-recognized science learning goals
  - Based on the *Benchmarks for Science Literacy* and *Atlas of Science Literacy* published by Project 2061 at the American Association for the Advancement of Science
- Enables teachers and learners to
  - Visualize and explore interconnected learning goals on important science topics
  - Locate online teaching and learning resources that support specific learning goals or science standards

# What's Been Our Impact?

- We save teachers and learners time
- We provide a trusted source
- We remove barriers of physical and social isolation
- We support the development of new technical skills and scientific knowledge



# What's Been Our Impact?

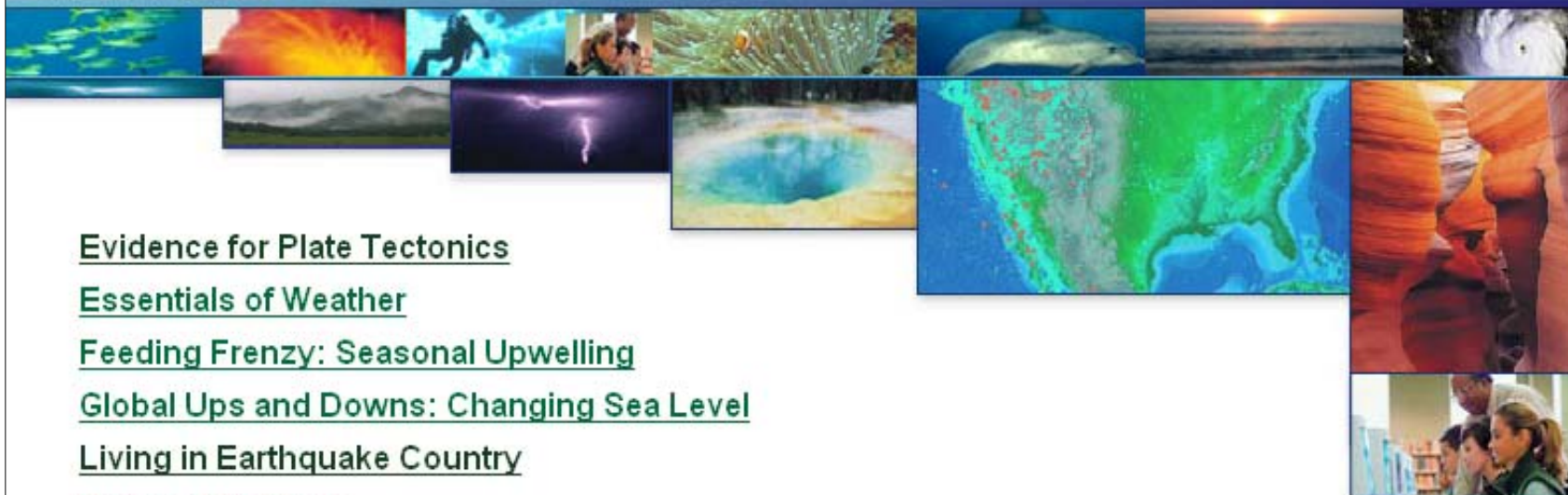
- Teachers tell us that:
  - Lesson plans are richer because of information from the Internet and experiences of other teachers
  - Students are more engaged in learning
  - They are better able to meet the varying needs of their students

# Questions?

# Content

# Contextualization

## DLESE Teaching Boxes



Evidence for Plate Tectonics

Essentials of Weather

Feeding Frenzy: Seasonal Upwelling

Global Ups and Downs: Changing Sea Level

Living in Earthquake Country

Mountain Building

### What are Teaching Boxes?

Teaching boxes are classroom-ready instructional units created by collaboration between teachers, scientists, and designers. Each box helps to bridge the gap between educational resources and how to implement them in the classroom. The Teaching Boxes contain materials that model scientific inquiry, allowing teachers to build classroom experiences around data collection and analysis from multiple lines of evidence, and engaging students in the process of science. - focusing on gathering and analyzing scientific evidence. All educators may use DLESE Teaching Boxes free of charge.

Evidence for  
Plate Tectonics (6-8)

## Overview: About this teaching box



## ▼ Overview of the box

[About this teaching box](#)[Concepts & standards](#)[Lessons in this box](#)[Prerequisites](#)[Technical requirements](#)

## Introductory activity

## ▼ Fossil evidence

## ▼ Earthquake evidence

## ▼ Volcano evidence

## Culminating activity

[Teaching Boxes Home](#)

This Teaching Box is an online assembly of interrelated learning concepts that focuses on finding the evidence for plate tectonics using digital resources, education standards, and comprehensive lesson plans. It is meant to provide an inquiry-based exploration of each of three lines of evidence:

- **Fossil distribution**
- **Locations, depths, and types of earthquakes**
- **Locations and types of volcanoes**

For each line of evidence there is a map showing supporting concepts and their associated standards, pre-conceptions, lessons organized into teachable units, and a section describing the resources used in the box for ready reference.

An **introductory activity** is designed to engage the students and to provide a segue into the theory first proposed by Alfred Wegener.

At the end of this unit on Exploring the Evidence for Plate Tectonics, students will have constructed an understanding of the three lines of evidence. An optional **culminating activity**, In Support of Wegener, is included that can be used to assess this understanding.

As an understanding of latitude and longitude is essential for several of the activities, an optional teaching unit on this topic is also included.

**Goals of the teaching box:** These activities are presented in a way as to emphasize the process of science – how evidence is gathered and hypotheses are tested. Guided inquiry has been used throughout, and where possible, we have tried to replicate the discoveries of science that have led to our understanding of plate tectonics. Taken as a whole, the activities within the teaching box demonstrate the inter-relatedness of Earth's processes and the lines of evidence, thus reinforcing the overarching concept: **the Earth is a system.**



Evidence for  
Plate Tectonics (6-8)

## Overview: Concepts and standards for this box as a whole



## ▼ Overview of the box

[About this teaching box](#)[Concepts & standards](#)[Lessons in this box](#)[Prerequisites](#)[Technical requirements](#)

## Introductory activity

## ▼ Fossil evidence


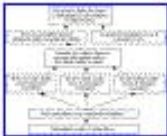

## ▼ Earthquake evidence

## ▼ Volcano evidence

## Culminating activity

[Teaching Boxes Home](#)

## Multiple lines of evidence support the theory of plate tectonics.

-  1. The distribution of [fossils](#) provide evidence for plate tectonics.
-  2. The location, depth, and type of [earthquake](#) provide evidence for plate tectonics.
-  3. The location and types of [volcanoes](#) provide evidence for plate tectonics.

## California State standards:

6th grade Earth Science: 1a, 1c, 1d, 1e Investigation and Experimentation: 7a,b,d,e,f,g

## National Science Standards:

Lithospheric plates on the scales of continents and oceans constantly move at rates of centimeters per year in response to movements in the mantle. Major geological events, such as earthquakes, volcanic eruptions, and mountain building, result from these plate motions. Fossils provide important evidence of how life and environmental conditions have changed. Scientists formulate and test their explanations of nature using observation, experiments, and theoretical and mathematical models. Although all scientific ideas are tentative and subject to change and improvement in principle, for most major ideas in science, there is much experimental and observational confirmation. These ideas are not likely to change greatly in the future. Scientists often change their ideas about nature when they encounter new experimental evidence that contradicts existing explanations.

## Evidence for Plate Tectonics (6-8)

### Overview of the box Introductory activity

### Fossil evidence

### Earthquake evidence

Introduction

Concepts & standards

Lesson sequence

Teaching & learning resources

### Volcano evidence

### Culminating activity

[Teaching Boxes Home](#)

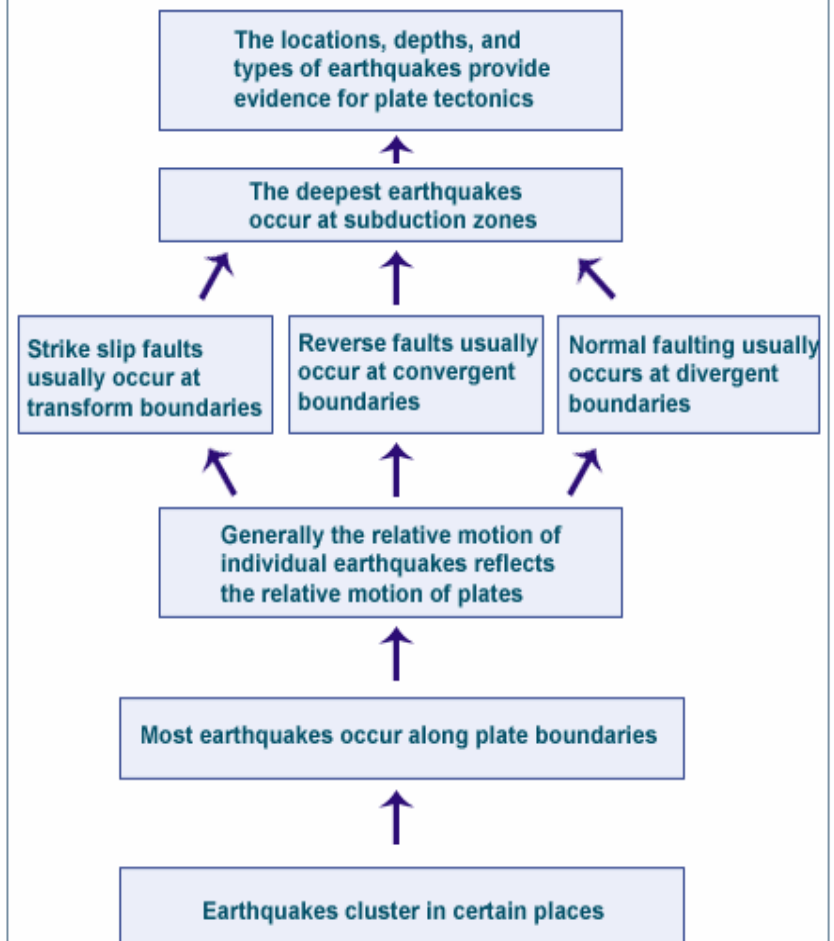
## Earthquakes as evidence: Concepts & Standards

 Print...


The following concepts are associated with the California State Science Standards and with the lessons shown. There are also National Science Education Content Standards represented in this teaching box.

CONCEPTS:	GRADES:	EARTHQUAKE LESSONS:
The locations, depths, and types of earthquakes provide evidence for plate tectonics	6: 1a	Lesson 4: Earthquakes as evidence: Tying it all together
The deepest earthquakes occur at subduction zones	6: 1c	Lesson 3: How deep is the earthquake?
<ul style="list-style-type: none"> <li>- Strike slip faults usually occur at transform boundaries</li> <li>- Reverse faults usually occur at convergent boundaries</li> <li>- Normal faulting usually occurs at divergent boundaries</li> </ul>	6: 1d	Lesson 2: Fault types & plate boundaries
Generally the relative motion of individual earthquakes reflects the relative motion of plates	6: 1c - 1d	Lesson 2: Fault types & plate boundaries
Most earthquakes occur along plate boundaries	6: 1e	Lesson 1: Plotting earthquakes from real-time data
Earthquakes cluster in certain places	6: 1a	Lesson 1: Plotting earthquakes from real-time data

### EARTHQUAKE CONCEPT MAP







## DLESE Teaching Boxes

- [Evidence for Plate Tectonics](#)
- [Essentials of Weather](#)
- [Feeding Frenzy: Seasonal Upwelling](#)
- [Global Ups and Downs: Changing Sea Level](#)
- [Living in Earthquake Country](#)
- [Mountain Building](#)

### What are Teaching Boxes?

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Teaching Box features:

- Conceptual framework with the key scientific concepts that students should understand as a result of conducting the investigation
- National and state science, math, and language arts standards