
Teaching Boxes: Supporting Content and Context

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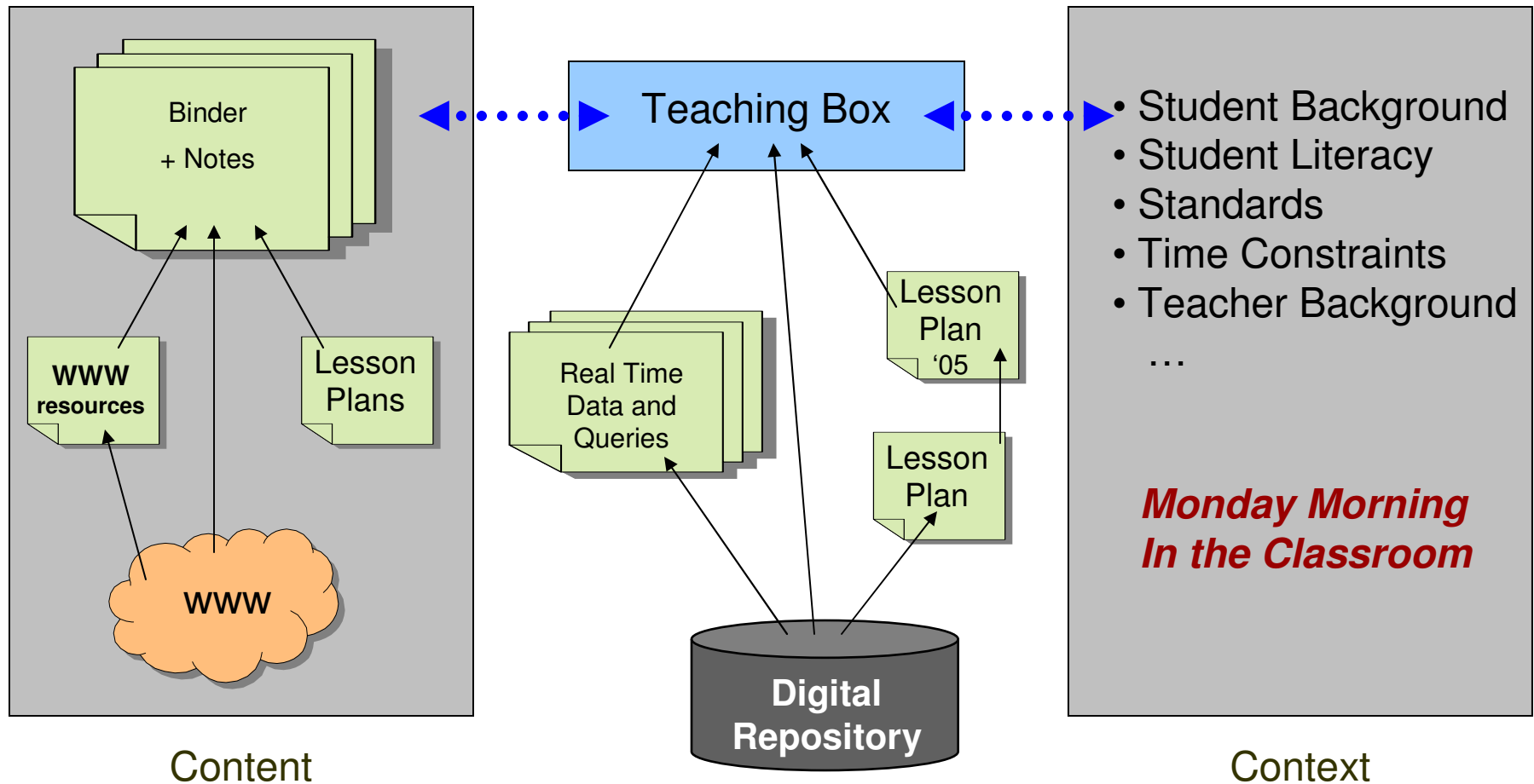
Overview

- Motivation and Overview
 - Problem and Suggested Solution
 - Architecture
 - Model (Repository and Components)
 - API
 - User Interface
 - Demo
 - Issues and Reflection
 - Future Directions
 - Q & A
-

Motivation

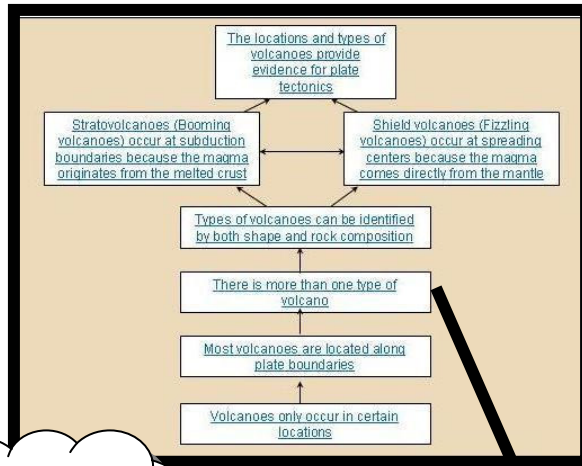
- Resource to Educator
 - Gap between rich digital library resources and usable materials for in-classroom teaching
 - Educators: Balance between standards and engaging curriculum
 - Digital Libraries: Multimedia, scientifically accurate, real time
 - Teaching Boxes Approach
 - Analogy with Binders and Collections used by Educators
 - Pedagogical Context
 - Customization: Use and reuse of digital resources
 - Collaborative effort: Educators, Scientists, Digital Library
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The Quick Explanation



DLESE Teaching Boxes: Components

CONCEPTS



RESOURCES

Discover Our Earth, Volcanoes Exercise:
http://atlas.geo.cornell.edu/education/student/volcanoes/volcano_1.html
A mapping tool. Part of an earth system educational web site that encourages learning for all ages.

- Concepts
- Technical requirements
- Full description

NSES: [5-8. Content Standard A: Science as Inquiry](#)
[5-8. Content Standard D: Structure of the Earth System](#)

Snack Tectonics
http://www.windows.ucar.edu/tour/link=teacher_resources/teach_snacktectonics.html

...other resources area of *Windows to the Universe*. Students ... model that illustrates plate tectonic motions.

- Technical requirements
- Full description

[Pilot/uploads/BlankWorldMap.pdf](#)

...t use.

- Technical requirements
- Full description

Concepts are directly linked to lesson components

Digital resources and lesson components are directly linked

Lesson 3. Volcanoes as evidence: Tying it all together

- **Lesson 2. Correlation of volcano types and plate boundaries**
 - **Activity 2 Instructions:**
 - “...Students will do Snack Tectonics ...”
- **Lesson 1. Locating Volcanoes around the world**

LESSON SEQUENCE

Problem

- Digital Resources Access
 - Search and Browse
 - Open Repositories
 - Digital representation
 - Pedagogical Content e.g. Volcano lesson
 - Pedagogical Context: student conceptions, rationale for an activity, etc.
 - Adaptation as use paradigm
 - Content and Context Adaptation
 - Flexible and Customizable representation
 - Non-linear Development
 - Cyclical problem finding and formulation
 - Adaptation and Revision
 - Conceptual Interdependencies
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Research Studies

Study	Objectives
2004 CA Pilot Study	<ul style="list-style-type: none">• Participatory design• Define structure• Examine TB process
2004 UI Study	<ul style="list-style-type: none">• Design UI• Develop prototype• User studies
2005 Workshop	<ul style="list-style-type: none">• Refinement of design process• Technology preview for collaborative design of boxes
2005 DLESE Meeting	<ul style="list-style-type: none">• Get feedback on component breakdown
2005 NSDL Critique Lab	<ul style="list-style-type: none">• Get feedback on specific UI elements

Architecture

- Teaching Box Model

- Components: Concepts, Lessons, Activities, Resources
- FEDORA Content Model: Components, Relationships, Annotations

- Web Services

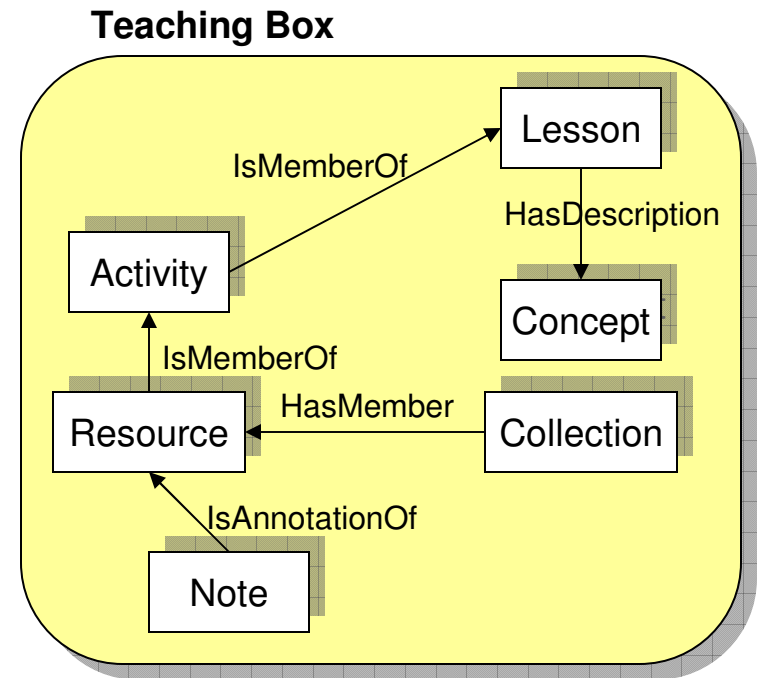
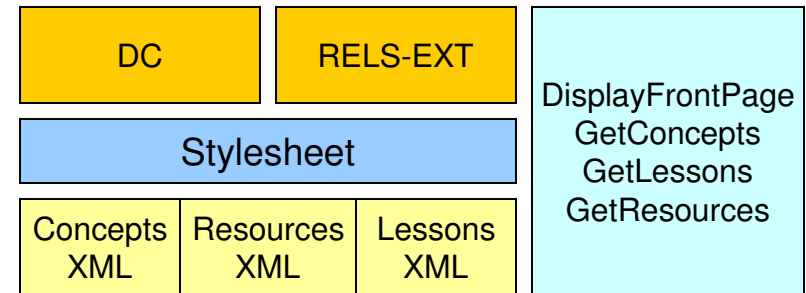
- Teaching Box API: Construction, adaptation, and annotation of components

- Web 2.0 Interface

- Integration of Search and Browse
 - Edit and Construct
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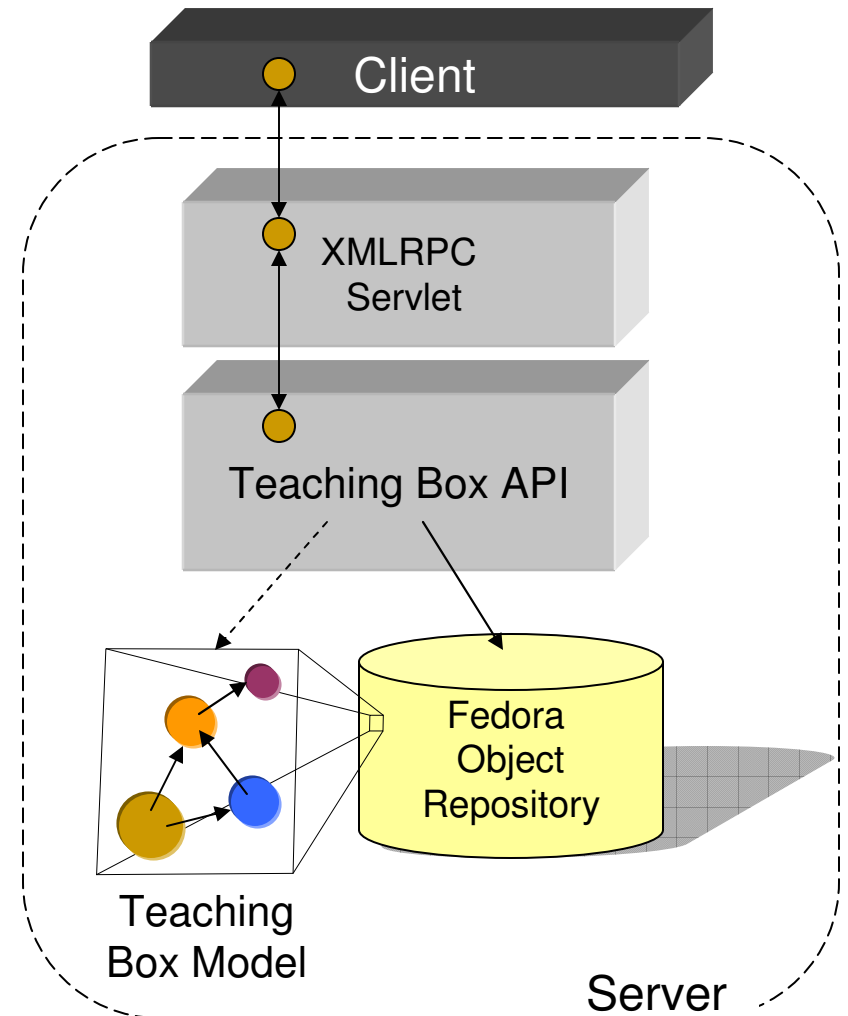
Teaching Box Model: Repository

- Components and Relationships
 - Teaching Box, Concepts, Lessons, Activities, Resources, Notes
 - Personalized Collections
 - Hierarchical Relationships (RDF)
 - Annotations (in progress)
 - Notes By Developers or Adaptors
 - Teaching Tips, Comments



Teaching Box API


- ❑ Web Services: Store, retrieve, modify model and relationships
- ❑ Integration of external DL services
- ❑ Search (resources) and View (collections)
- ❑ Issue and Manipulate results of queries at API level (API-M)
- ❑ Search across/Create Relationships
- ❑ Create/Modify Components



Web 2.0

- Access to varied digital collections
 - UI Integration of search and browse of digital library and personal collections
 - Streamlined delivery of multiple query results
e.g. get all concepts and for each concept get lessons and standards through API
 - Web Service API achieved through XMLRPC
 - Simple, fast, allows for rich client prototype development
 - Full client manipulation of XML
 - Migrate to more robust and secure API
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Demo



DLESE Teaching Boxes

Volcanoes as Evidence for Plate Tectonics(6-8)

Welcome Susan
Lesson 1: Locating Volcanoes around the world

Overview of the box

Concepts and Standards

Lessons:

- 1 Locating Volcanoes around the world
 - Activities:
 - 1 Predicting volcano locations
 - 2 Creating a map of earthquakes and volcanoes
 - 2 Correlation of volcano types and plate boundaries
 - 3 Volcanoes as evidence: Tying it all together

Online resources

Your Account

Logout

Activity: activity for volcano [\(Click to edit\)](#)

Rationale [\(Click to edit\)](#)
A map of worldwide shield volcanoes, stratovolcanoes, and earthquakes is created from real data to illustrate that there is a pattern in volcanic and seismic activity.

Procedures [\(Click to save\)](#)

Students will map volcanoes and earthquakes on the earth to test their hypotheses generated in Activity 1 using a computer-based mapping site.

1. Students will go to the [Discover Our Earth](#) web site, Exercise 1 on volcanoes. The activity asks students to use the QUEST mapping capability on the site to map shield and stratovolcanoes.

Materials [\(Click to edit\)](#)
Small 8.5 x 11 inch maps for individual students using the Blank World Map.

Teacher Preparation [\(Click to edit\)](#)
Remind students to have their earthquake activity maps from Earthquakes Lesson 2 Plotting Earthquakes Using Real-Time Data available or make them available.

Resources Used [\(Add from Search or Browse\)](#)

- [Discover Our Earth](#) [\(Open URL\)](#) [\(Added To Collection and Activity\)](#)
[View full description](#)
Your Notes: This resource will help students make the connection between volcanic and seismic activity.

Search DLESE

volcanoes

Educational resources

Add Resource

Volcanoes
<http://www.glyfac.buffalo.edu/gerp/volcanoes.html>
This computer-based interactive module discusses types of volcanoes, products of volcanoes, and ...[Full Description](#)

Add Resource

Volcanoes!
<http://volcano.und.nodak.edu/volcan>

Personal Collection: Volcanoes

[Browse Collection](#)

Add Resource

Discover Our Earth
<http://atlas.geo.cornell.edu/education/index.html>
Cornell University's Discover Our Earth educational web pages provide interactive data analysis and ...[Full Description](#)

Add Resource

Issues and Reflection

- Creation/adaptation of pedagogical content and context
 - Context central to design concerns
 - Review of tasks and cognitive processes
 - Repository integration with Web 2.0
 - API layer allows separation of form from function
 - Interface layer communicates with API
 - Time delays undesirable
 - Moving to Fedora 2.2
 - Searching across lesson, activity, concept content
 - Extended/customized schema
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Future Directions

- Concept Map Modifications
 - Integration with additional web services. Possibilities:
 - Checking Broken Links
 - User Registration
 - New Resource Suggestions
 - Standards
 - Annotation framework
 - Edit and View
 - Multiple lesson, resource, and activity view
 - View concept map and/or objectives during modifications
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Future Directions (II)

- Collaboration
 - Private and Public Views
 - Workspaces and Versioning
 - Studies
 - Usability Study for Teaching Box Builder Version 1.0
Spring 2007
 - Think Alouds and/or Cognitive Walkthroughs
 - Deployment of Application with 3-4 Experts Fall 2007
 - Explore educators' adaptations of curriculum using Teaching Box Builder and Teaching Box curriculum
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Q & A

- DLESE Teaching Boxes,
<http://www.teachingboxes.org>
 - Presentation, Project Wiki and (demo)
<http://redpoll.colorado.edu>
 - huda.khan@colorado.edu,
keith.maul@colorado.edu at Boulder
Learning Technologies, University of
Colorado at Boulder
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