Building Collaborative Tools on NSDL 2.0

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Presentation Overview

- NSDL 2.0: Infrastructure for a Collaborative Digital Library
- Planned Collaborative Tools:
  - Expert Voices
  - OurNSDL
  - MyNSDL
  - Other tools
- Collaborative Tool Challenges
- Discussion
Infrastructure overview: NSDL 1.0

- STEM Collections on the Web
- Search Service
- Central Metadata Repository
- Archive Service
- Collection Registration System
- NSDL.org Portal
- Protocol: OAI-PMH, HTTP, REST, SQL
NSDL 2.0

- Create an NSDL that guides not just resource discovery, but:
  - Supports creating “context” for resources
  - Presents resources in context: linked to related concepts; with user ratings; with codes and data
  - Enables community tools for selecting, organizing, evaluating, annotating, contributing, and collaborating
  - Provides two-way data flow: NSDL ↔ users

- Goal: Create a dynamic, living library
In Architectural terms, create an NSDL Data Repository that

- Supports storing both content and metadata
- Allows arbitrary relationships among resource and metadata objects: organization, annotation, citation
- Accessible through web service architecture of remixable data sources and transformations
NSDL Data Repository (NDR)

- References to roughly 2 million selected STEM resources on the web
- Sourced metadata statements about those resources
- A REST API allows authenticated access by Pathways, providers, tool builders
- Currently live on development server (nsdlib.org) and in final testing
- Production release Jan. 15 at nsdl.org
Sample NDR Objects & Relationships

- Cornell CCMR
- Publication Metadata
- Data Set Metadata
- Data Set Resource
- Soft Matter Collection
- Selector for
- MatDL Pathway
- MatForge Collection
- Member of
- Metadata for
- Cites
- Metadata for
- Metadata for
- Member of
- Cites
NDR API Characteristics

- Uses REST calls for all interactions; uses handles (DOIs) for all external references
- Ensures external applications can’t violate the NDR model constraints
- Disseminations allow combining metadata from multiple sources, or related content
- Authentication: Requests signed with private key associated with an agent
- Authorization: Agent can become a metadata provider or aggregator; can create resources
- API/NDR instance available for development and testing (ndrtest.nsdl.org)
An Information Network Overlay

- Think of the NDR as a lens for viewing science content on the net

- Content can be:
  - Local: stored directly in the NDR
  - Remote: accessed through a URL
  - Computed: derived from a database or web service
  - Archived: an older version stored at SDSC

- It all has a repository-based URL
Network Overlay View

User View

API/UI

Repository View with Relations & Annotations

Resources on the Web
Applying the NDR

- The NDR provides powerful capabilities for:
  - Creating context around resources
  - Enabling the NSDL community to directly contribute resources and context
  - Representing a web of relationships among science resources and information about those resources

- How do we use it? Here’s one specific example ...
What is Expert Voices?

- The NSDL Blogosphere
- Topic-based discussions (e.g. forensics) with pointers to related resources
- An outreach tool to explain and document NSF-funded research
- A way for NSDL community members to become NSDL contributors: of resources, questions, reviews, annotations, metadata
- A question/answer and discussion forum: scientist ↔ teacher ↔ student ↔ librarian
What isn’t EV?

- Expert Voices ≠ LiveJournal
- Contributors are carefully selected, contributions are about science, the process of science, and education

Comic by Michael Lalonde/orneryboy.com
“Hurricane Season Blog”
Authors: NWS hurricane expert, Earth Science teacher, and a school media specialist familiar with NSDL

Expert: “Hurricane Gertrude is heading for Ft. Lauderdale; 15 foot storm surge expected; undergoing eyewall replacement cycle”

Media specialist: NSDL resource links
- Hurricane Hunters site
- Latest satellite photos
- USGS flooding and flood plain web page

Teacher: relevant standards and appropriate pedagogy

Students: engaging real-time, real-world applications of science lessons
Expert Voices
Implementation

- Wordpress-based multi-user multi-blog application (open source, plug-in architecture)
- Published entries become NSDL resources
- Owner controls publication of entries and visibility of comments
- Entries can contain linked references to NSDL resources, references to URLs that should become resources, and new resource metadata
- Integrated with NSDL Shibboleth-based community sign-on (Wordpress plug-in)
- Blog(s) available as RSS feed(s)
K12 Teachers
- Teaching Measurement at the Middle School Level: Jun 2nd, 2006
- Bringing the Field to the Classroom: Birds: Oct 4th, 2006
- Meeting web kids on their own turf: Sep 21st, 2006
- Boneyard Science: Investigating Forensics: Apr 29th, 2006

University Faculty
- Presentation of Math on the Web: Jun 20th, 2006
- How can digital education help the Gulf Coast?: Oct 3rd, 2006

Librarians
- How can digital education help the Gulf Coast?: Oct 3rd, 2006

NSDL Community

Informal Learners
- Bringing the Field to the Classroom: Birds: Oct 4th, 2006
- Meeting web kids on their own turf: Sep 21st, 2006
What's in the night sky?

About What's in the night sky?:
Teaching and learning about the solar system.

Contributors:
admin

Jupiter's Spots
Tuesday, October 17th, 2006 8:20 pm
Contributed by: admin

According to an article on the Sky and Telescope Magazine - Astronomy News NSDL, Jupiter's tiny white spot is going red.

Find out more about the storms on Jupiter.
Solar system resources

Teachers in upstate New York attended a seminar on teaching a 4-6th graders astronomy. The presenters began with constellations and star identification, followed by phases of the moon, and, later, Jupiter.

Not all communities have a planetarium or one within driving distance, but there are resources in NSDL that can help teach kids how to stargaze.
What's in the night sky?

Write Post

Title: Solar system resources

Post:

Create link to NSDL resource

Not all communities have a planetarium or one within driving distance of their resources in NSDL that can help teach kids how to start.
Write Post

Title
Solar system resources

Post
Create link to NSDL resource

Teachers in upstate New York attended a seminar on astronomy. The presenters began with constellations and the moon, and, later, Jupiter.

Not all communities have a planetarium or observatory within driving distance. NSDL has resources in NSDL that can help teach kids how to start stargazing.

Stargazer
http://sciencesmith.ca/learn/coolscience/stargazer/index.html
Check out what constellations you can see in the night sky. You pick the date, the time, and the latitude.

Select Search Result

Close Window  Go Back
What's in the night sky? (View site ➯)

Write Post

Title
Solar system resources

Post
Create link to NSDL resource

Teachers in upstate New York attended a seminar on teaching 4-6th graders astronomy. The presenters began with constellations and star identification, followed by phases of the moon, and, later, Jupiter.

Not all communities have a planetarium or one within driving distance, but there are resources in NSDL that can help teach kids how to stargaze.

Stargazer NSDL
Path: p

Save and Continue Editing  Save

Categories

Add Post as Resource
Add a Resource

Contribute to the NSDL

Select multiple categories with commas.

Bookmarks  Education  General  Health  Mathematics  Science  Astronomy  Social Studies  Technology
What's in the night sky?

About What's in the night sky?:
Teaching and learning about the solar system.

Contributors:
admin

Solar system resources
Tuesday, October 17th, 2006 8:37 pm
Contributed by: admin

Teachers in upstate New York attended a seminar on teaching a 4-6th graders astronomy. The presenters began with constellations and star identification, followed by phases of the moon, and, later, Jupiter.

Not all communities have a planetarium or one within driving distance, but there are resources in NSDL that can help teach kids how to stargaze.

StargazerNSDL

Posted in Topics: Science, Astronomy

Jupiter's Spots
Write Post

Title
Solar system resources

Post
Create link to NSDL resource

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Not all communities have a planetarium or one within driving distance, but there are resources in NSDL that can help teach kids how to stargaze.

Path: p

Save and Continue Editing Save

Upload
Browse All

File: Browse... Title:
But Expert Voices is just the beginning…
OurNSDL: NDR-integrated Wiki

- Community of approved contributors (e.g. teachers, librarians, scientists) are granted edit access on OurNSDL wiki
- New resources and metadata are created as wiki pages and reflected into the NDR
- Non-wiki-based NDR resources and metadata are displayed as read-only wiki pages, subject to comment and linking
- User and project pages organize NDR resources
- Planned implementation in MediaWiki
Genetic Genealogy

This is an OpenNSDL page describing an external digital STEM resource. Information on this page is mirrored into the NSDL Data Repository (NDR). Any changes made to the information about the resource on this page will update the corresponding NDR information.

Comments: Here's an excellent site providing an introduction, definitions, and web resources on the use of DNA Testing in Genealogy. The overall topic provides a very interesting social motivation for some deep and interesting genetic science.

Kerchner's DNA Testing & Genetic Genealogy Info and Resources Page

- Download free copy of my Genetics & Genealogy - An Introduction - a Genetic Genealogy 101 report.
- Read and review online my Genetic Genealogy Glossary of Genetic Genealogy terms and definitions.

Title: Kerchner's DNA Testing & Genetic Genealogy Info and Resources Page
Description: This page provides a number of website links to resources in the intersection of genetics, DNA testing, and Genealogy.

NSDL Item Level Metadata:
- Title: Kerchner's DNA Testing & Genetic Genealogy Info and Resources Page
- Subject Keyword(s): Genetics, Genealogy, DNA Testing, Haplogroup
- Description: This page provides a number of website links to resources in the intersection of genetics, DNA testing, and Genealogy.
- Publisher / Resource Provider: Charles F. Kerchner, Jr., P.E.
- Resource type: text/html
- Link: [1]
- Language: en
- Rights Information: Copyright ©2003-2006 Charles F. Kerchner, Jr., P.E. GGP (Genetic Genealogy Pioneer) All Rights Reserved
- Grade Level: High school, Informal education, Middle school, Undergraduate lower division, Undergraduate upper division
- HTML Title: Kerchner's DNA Testing & Genetic Genealogy Info and Resources Page
NDR Entry for OurNSDL

Wiki Entry

New Metadata

Metadata for

Referenced New Resource 1

Inferred relationship between resources

New Audience MD

Existing Collection

New Resource 1

Existing Resource 2

Referenced Existing Resource 2

Topic-based Wiki

Member of

Member of

Metadata Provider

Metadata Provider

Annotates

Metadata for
MyNSDL: NDR-integrated tagging, bookmarking, and recommendation

- Based on Connotea open-source folksonomic tagging/bookmarking system
- Tags and bookmarking structure are reflected back into the NDR
- Authorized users can “automatically” recommend new NSDL resources simply by tagging them
- Gives user a personal view of NSDL resources
NPR - Radio Expeditions: Disappearing Frogs
www.npr.org
Posted by deanbkraft to frogs NSDL on Thu Apr 27 2006 at 17:54 UTC | info

Exploratorium: Frogs
www.exploratorium.edu
Posted by deanbkraft to frogs NSDL on Thu Apr 27 2006 at 17:53 UTC | info

Deformed Frogs in Minnesota - Minnesota Pollution Control Agency
www.pca.state.mn.us
Posted by deanbkraft to frogs NSDL on Thu Apr 27 2006 at 17:53 UTC | info

What Is a Digital Library Anyway? Beyond Search and Access in the NSDL
Carl Lagoze et al.
D-Lib Magazine 11 (11), (Nov 2005)
doi:10.1045/november2005-lagoze
Dub paper describing how NSDL creates context and enrichment for digital library resources
Posted by deanbkraft (who is an author) and 8 others to digital library NSDL on Thu Apr 27 2006 at 17:31 UTC | info

NSDL - The National Science Digital Library
NDR Application: Content Assignment Tool

- Developed by Anne Diekema, Elizabeth Liddy, et al. at the Syracuse University Center for Natural Language Processing
- Uses text analysis and machine learning to suggest Educational Standards alignment for resources
- Content expert assigns standard, and system learns from the assignment
- Standalone tool available now; standards associated with resources in the NDR 4Q06
Tennessee (9-12)
Physical Science: Standard Number: 2.0 Structure and Properties of Matter: Standard: The student will examine the structure, properties, and classifications of matter.
Sample Task: "What's This in My Food?" Empty the contents of an individual cream of wheat package into a container. 2. Add just enough water to completely cover the cereal. Stir the water and cereal mixture with a bar magnet for at least ten minutes. Remove the magnet. Let the liquid on the magnet drain back into the bowl. Use a piece of white tissue paper to remove the particles attached to the magnet. Use a hand lens to observe the particles. What did you remove from the mixture? Is the cereal a heterogeneous or homogeneous mixture? Why? Point out that all mixtures can be separated because they contain two or more substances that are physically, not chemically, combined. Mixtures can be in any of the four phases. When a mixture is separated, each substance in the mixture retains its own properties.

Connecticut (9-9)
Chemical Structures and Properties: Properties of Matter - How does the structure of matter affect the properties and uses of materials?
9.4 Atoms react with each other to form new molecules.
Atoms have a positively charged nucleus surrounded by negatively charged electrons.
D 12. Explain the chemical composition of acids and bases, and explain the change of pH in neutralization reactions.

Kansas (5-8)
Standard 4: Earth and Space Science: Benchmark 2: The students will understand that past and present earth processes are similar.
1. Understand the dynamics of earth's constructive and destructive forces over time.
Examples: Construct models of rock types using food. Peanut brittle without the peanuts can illustrate a molten material crystallizing to form a solid substance similar to an igneous rock. Use an acid (vinegar or dilute HCl) to show the chemical similarity of limestone rock and fossilized shells. Students take a piece of sandstone and apply destructive forces to change it into sand. Observe the effects of weathering on various rock types.

Kentucky (5-7)
Conceptual Understandings: Physical Science: Properties and Changes of Properties in Matter: The chemical properties of a substance cause it to react in predictable ways with other substances to form compounds with different characteristic properties. In chemical reactions, the total mass is conserved. Substances are often classified into groups if they react in similar ways.

Oklahoma (8-8)
Standards for Inquiry, Physical, Life, and Earth/Space Science: Physical Science: Standard 1: Properties and Chemical Changes in Matter -- Physical characteristics of objects can be described using shape, size, and mass. The materials from which objects are made can be described using color, texture, and hardness. These properties can be used to distinguish and separate one substance from another. The student will engage in investigations that integrate the process standards and lead to the discovery of the following objectives:
1. Substances react chemically with other substances to form new substances with different characteristics (e.g., rusting, burning, reaction between baking soda and vinegar, etc.).
NSDL Collection System

- Developed by DLESE from DCS
- Allows creation and editing of collection and item metadata records
- Extensive guidance and help for various categories of metadata
- Syncs records using the NDR API
- First prototype developed
- Released version expected 2Q07
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**Subjects**

- add subjects remove

**Table of Contents**

- add table of contents

**Bibliographic Citation**

- add bibliographic citation

**Languages**

- add languages remove
A substance has characteristic properties, such as density, a boiling point, and solubility, all of which are independent of the amount of the sample. A mixture of substances often can be separated into the original substances using one or more of the characteristic properties.

Substances react chemically in characteristic ways with other substances to form new substances (compounds) with different characteristic properties. In chemical reactions, the total mass is conserved. Substances often are placed in categories or groups if they react in similar ways; metals is an example of such a group.

Chemical elements do not break down during normal laboratory reactions involving such treatments as heating, exposure to electric current, or reaction with acids. There are more than 100 known elements that combine in a multitude of ways to produce compounds, which account for the living and nonliving substances that we encounter.
Other planned/possible collaborative tools

- OnRamp – multi-user, multi-project NDR-integrated content management system
- Instructional Architect: Lesson plan development for K12 teachers (Utah State)
- Moodle CMS – courses integrated with NSDL resources
- Electronic Lab Notebook – MatDL
NSDL 2.0 Timeline

- Jan 15, 2007: NDR release at nsdl.org, public beta of EV
- March 2007: Public beta of OurNSDL, public beta of OnRamp
- April 2007: Public beta of MyNSDL, released version of Expert Voices
- April-June 2007: Release of NSDL Collection System
What are the challenges in creating a collaborative NSDL?
Contribution

Portal:Biology
From Wikipedia, the free encyclopedia

The Biology Portal

Welcome to the biology portal. Biology, from the Greek words bios (life) and the suffix -ology, meaning study of, is a branch of science. It is concerned with the characteristics and behaviors of organisms, how species and individuals come into existence, and the interactions they have with each other and with their environment. Biology encompasses a broad spectrum of academic fields that are often viewed as independent disciplines. Together, they study life over a wide range of scales.

Blue has been chosen as the colour for this portal to emphasise that life on Earth relies on the unique chemistry of water. A photo of *Darringtonia californica*, the cobra lily, was chosen as the portal icon for this species' dependency on a humid habitat, as well as illustrating both autotrophy (in this case, photosynthesis) and carnivory. Finally, they superficially resemble young shoots, with their tips curved in, symbolising growth, a feature of all life.

Selected article

The *Kākāpō* (Māori: *kākāpō*, meaning night parrot), *Strigops habroptilus* (from the Greek *strix*, genitive *strigos*: owl and *opus*: face; and *habro*:: soft, and *ptilon*: feather), is a species of nocturnal parrot endemic to New Zealand. It is notable for being the world's only flightless parrot, the heaviest parrot, and the only parrot to have a lek breeding system. It is also the only flightless lek bird and is possibly one of the world's longest-living birds. It is the only species in the genus *Strigops* and the tribe *Strigopini*, which is placed in the subfamily Psittacinae, or alternatively the kakapo forms a subfamily of its own, *Strigopinae*.

Kakapo are critically endangered, with only 88 living individuals known, all of whom are named. Prehistorically, the ancestral Kakapo migrated to the islands of New Zealand and, in the absence of mammalian predators, it lost the ability to fly. With Polynesian and European colonisation and the introduction of predators such as cats, rats, and stoats, almost all the Kakapo were wiped out. Conservation efforts began in the 1890s, but they were not successful in the eradication of predators. However, clipping

Selected picture

Two Centrosaurini in an artist's impression of male combat.

...Archive

Read more...
Trust and reputation in NSDL

- We brand NSDL as a source of “trusted” resources
- What is our trust mechanism?
  - Transitive trust approval
  - Community rating/filtering/reputation
- Trusted vs. complete “views”
- What is the right balance of trust vs. community contribution?
Community Formation

- Build the tools and they will come?
- What can we learn from Wikipedia, MySpace, Flickr, and YouTube?
- How do we leverage existing societies and groupings (NSTA, ACM, AAPT, AAAS)?
- Is there an NSDL community, or are there many small communities?
Summary

- NSDL 2.0 and its tools allow scientists, mathematicians, teachers, engineers, librarians, and students to create a unique web of context, contribution, and collaboration around the high-quality STEM education resources at the core of the NSDL.

- NSDL partners must work together to transform this collaborative capability into a collaborative reality.
Discussion

- Can these general tools be applied to the BEN community?
- Are there other specific collaborative tools you could use?
- What is an acceptable trust model for NSDL collaboration?
- What concrete steps can we take to build collaborative NSDL communities?
Acknowledgements

- NSDL NSF Program Officers
  - Lee Zia
  - David McArthur

- NSDL Core Integration Team
  - UCAR: Kaye Howe, PI and Executive Director
  - Cornell: Dean Krafft, PI
  - Columbia: Kate Wittenberg, PI

- Fedora Development Team
  - Cornell: Sandy Payette & Carl Lagoze
  - Univ. of Virginia: Thornton Staples
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