The NSDL Resource Center

NSDL

THE NATIONAL SCIENCE DIGITAL LIBRARY

NSDL Resource Center

Mission:

To support the NSDL community by coordinating resources, tools, information, and relationships that can enhance the quality, utility, and educational impact of NSDL projects, and ensure the long-term relevance and sustainability of the NSDL enterprise.

Baseline Activities:

Community coordination, annual PIs meeting, outreach, communications, professional development, presentations and workshops, brokering partnerships and opportunities, trends monitoring, stakeholder engagement

Resource Center Team

Kaye Howe *Director* 0.8 FTE	**Susan Van Gundy** *Deputy Director* 1.0 FTE	**Mary Marlino** *Evaluation Director* 0. 08 FTE

Donna Cummings *Office Manager* 1.0 FTE	**Eileen McIlvain** *Communications Manager* 1.0 FTE	**Digital Learning Sciences** *Evaluation Support* 0.60 FTE
	Laura Moin *Professional Devel Manager* *1.0 FTE* *May 17 Start Date*	**Project Tomorrow** *Educational Technology Consultants* www.tomorrow.org

Relevant Trends

The increasingly networked and mobile learner

e.g., Speak Up 2009 data (tomorrow.org)

Large federal initiatives: Common Core Standards, Race to the Top, National Educational Technology Plan, Federal Broadband Plan

Increasing interest in district and state-level resource portals: threats and opportunities

Digital textbooks including Beyond Textbooks (beyondtextbooks.org)

Shared Strategies with TNS

- Maintain and operate the technical infrastructure

- Mobilize the community

- Improve the NSDL.org user experience

- Support educational exemplars

- Extend strategic partnerships

- Evaluation and Analysis

Community Infrastructure…

NewNSDL Community Website (NSDLnetwork.org)

Discussions, information sharing, project profiles, community networking

Launched in November 2009 as annual meeting website

New information site for prospective grantees and other contributors

NSDL Accessioning Board

reviews and approves accessioning and deaccessioning

responsible for ensuring that collections meet the collections policy criteria

comprised of up to five representative members of the NSDL and STEM education community who do not have explicit conflict of interest in NSDL collection review activities

Richard Audet
STEM Education Consultant

Elizabeth Brown
Binghamton University Libraries

Marcia A. Mardis (Chair)
The Florida State University

Robert Payo
Denver Museum of Nature and Science

Lutishor Salisbury
University of Arkansas Libraries

NSDL

Metrics Working Group

May 2010 report recommends best practices for comprehensive project metrics collection and analysis in four broad areas:
- Web portal or web site
- Community building /social media
- Outreach and marketing
- Professional development and training

Challenging to apply a common set of metrics across the diversity of NSDL projects

Recommends the RC/TNS implement an automated method for projects to report minimal set of metrics on monthly basis

Project Activity or Function	Probes & Metrics
Web Portal or Web Site /General Technical Development	
Web metrics	• Number of registered users • Number of visits • Pages per visit • Unique visitors • Percentage of new visitors • Bounce rate • Average time on site • Visitor locations (geographic: country, state, zip code) • Most popular pages • Traffic sources (direct, referring, search engines). Analysis of types of domains: K12 schools; colleges/universities; museums/science centers, etc • Search engine terms • Non-library downloads (i.e. downloads exclusive from collection search functions, such as for outreach materials)

Project Activity or Function
Outreach and Marketing Activi...
Materials distribution
Web seminars
Publications
Conference presentations

Project Activity or Function	Probes & Metrics
Professional Development & Training	
Conferences, exhibit booths, information sessions	• Number and type of events per year • Number of attendees per session; demographic types of attendees • Number of contacts from exhibit booths (estimated if not specifically tracked) • Number of follow-up contacts made • Number of event-oriented support system requests • Analysis of session evaluations + delayed session evaluations • Testimonials, kudos – positive feedback received from participants; quotes
Face-to-face Workshops	• Number per year • Number of attendees in the session; demographic types of attendees

NSDL-NSTA Web Seminars

- **ChemEdDL** -- *Chemistry Comes Alive IV: Oxidation/Reducation*
- **Dragonfly TV** -- *Knowing Nano: New Video, Web, and Print*
- **Middle School Portal** -- *Timely Teachings: Seasons and the Cycles of Night and Day*
- **ActionBioscience** -- *Thinking Like a Scientist: Teaching and Learning Through Current Science Issues*
- **Teachers' Domain --** *Teaching Biotechnology: New Tools and Resources for the STEM Career Pipeline*
- **Project BudBurst** -- *Involving Students in Climate Research*

NSDL Virtual Brown Bags

- **Lecture Tools** Demonstration
- **Project Tomorrow** – Speak Up 2008 Report
- **CLEAN Pathway** Overview
- **MathPath** Overview
- New Projects/People Orientation
- **Marcia Mardis** -- *School Librarians: An NSDL Trends Report*
- **SERC** -- *Pedagogy in Action and the NSDL Pedagogical Service – Helping Users Teach with Your Materials*

National Workshops

Cyberlearning Tools for Climate Education: Community Needs Assessment Workshop (September 2009)

Planning for the Future of GeoCyberEducation (January 2010)

NSDL

Community – Content – Context – Capacity
for Teaching and Learning in a Networked World

Leveraging the existing network of NSDL partners to develop new strategic alliances with educational stakeholders

Redefining NSDL's value as a content provider to practitioner networks and educational systems' portals

Enabling both expert and user contextualization of resources based on practitioners' on-the-ground needs

Developing users' capacities to effectively integrate cyberlearning resources in the classroom.

Ongoing Challenges

Discoverability

Granularity

Relevance

Persistence

Intellectual Property

Sustainability

Evaluating Impact

Issues of metadata creation, scalability, quality, interoperability, stability, maintenance,

Scant knowledge of educators' resources use outside of structured applications and interventions

NSDL

Leveraging NSDL Science Literacy Maps as the basis for partnerships with state departments of education and other stakeholder groups.

2009-2010:
Working with Georgia State Department of Education to bring NSDL resources aligned to Georgia standards and AAAS Bechmarks into state portal

Discussions with Indiana put on hold awaiting information about Common Core standards
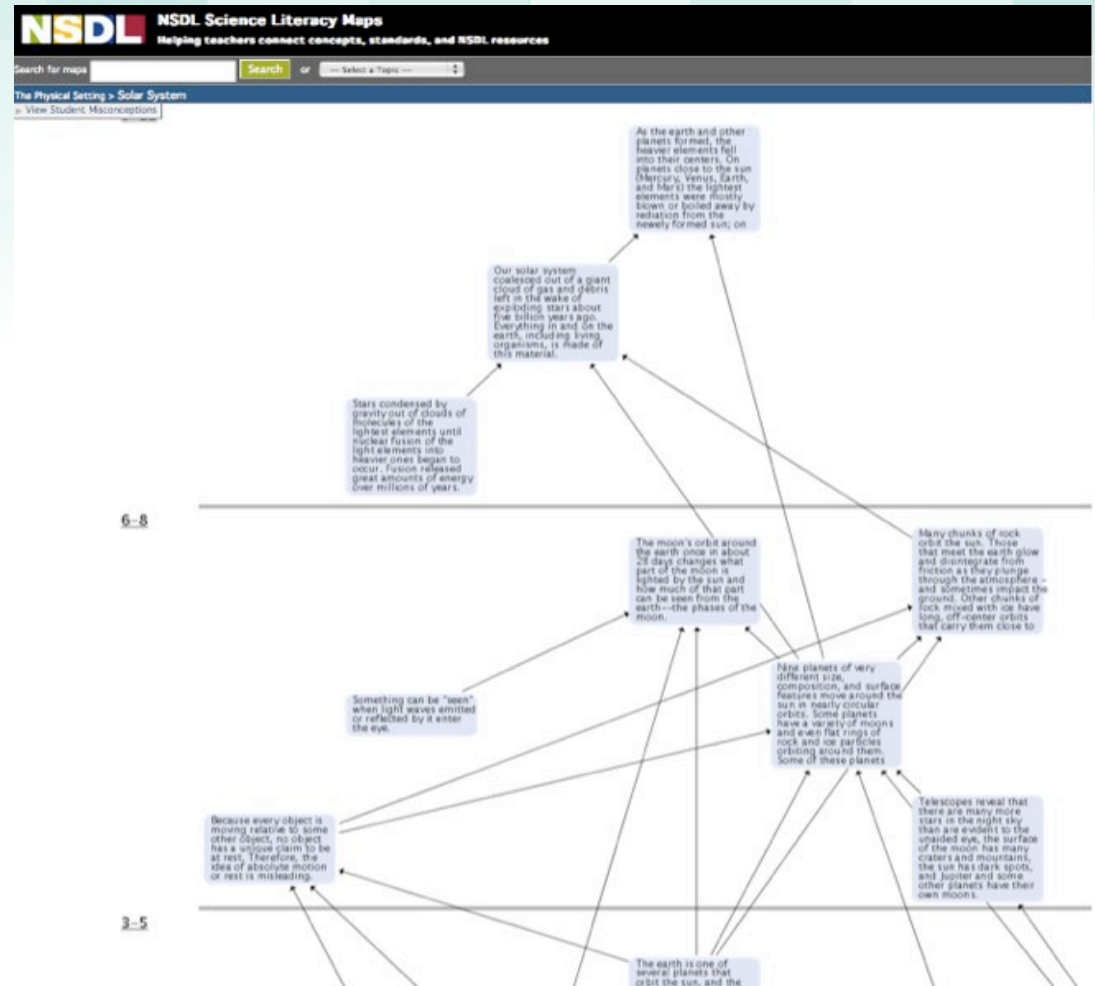
NSDL Common Core Collections

A new initiative developed in cooperation with the White House Office of Science and Technology Policy

Aligning subsets of NSDL collections to new Common Core educational standards for pK12

Developing new approaches for characterizing relationships of resources to standards

Initial Math Common Core collection targeted for Fall 2010, Science collection to follow

Math collection developed in partnership with Internet Scout, AAAS Project 2061, MathForum, MathPath

NSDL

The STEM Exchange:

A Dissemination and Broader Impacts Initiative developed in cooperation with the White House Office of Science and Technology Policy

Broad Goals

- Enhancing the diffusion and access of NSDL resources to educational practitioner communities

- Aligning NSDL Resources to new Common Core standards

- Tapping practitioner knowledge and craft to add valuable context around cyberlearning resources

- Enhancing understanding about the adoption and impact of cyberlearning resources

- Developing models that will be of value to other federal agencies and other resource providers

- Embodying open source, open access, open resource practices

Stakeholder Engagement

Organizations participating in early discussions at varying levels include:

Advance Distributed Learning (DOD)

BetterLesson

Beyond Textbooks / Vail, AZ Unified School District

California Dept of Ed / Brokers of Expertise

Concord Consortium

Corporation for Public Broadcasting

Curriki

Discovery Education

Elluminate

ePals

FCC

George Lucas Educational Foundation

Georgia Department of Education

The Library of Congress

Microsoft Education

IBM

Intel

International Association for K12 Online Learning

ISKME/ OERCommons

National Council of Teachers of Mathematics

National Geographic Society

National Science Teachers Association

NYSci

PALM Center at Florida State University

PBS

Project Tomorrow

The Smithsonian

Southern Regional Education Board

NSDL Projects participating in Common Core and STEM Exchange

AAAS

AMSER

comPADRE

CLEAN

MatDL

MathForum

MathPath

MSP2

SERC

SMILE

Teachers' Domain

Why the STEM Exchange?
The Limitations of Metadata

- labor intensive, expensive

- metadata creation and exchange requires technical library expertise

- essential but not sufficient

Educational Impact: We are missing much of the picture…

Discover – Select – Use – Reuse – Remix – Contextualize →

Search	Link	Share
Browse	Download	Embed
		Reauthor
		Recommend
		Favorite
		Review
		Tweet
		Feed
		Align
		Adopt
		Personalize
		Customize
		Bookmark
		Mash Up
		…

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Why the STEM Exchange?
The Evolving Power of Context

- scarcity of content is no longer the issue

- content alone does not transform

- content creation as a powerful learning process

- need to liberate the wisdom of teacher communities around content to achieve transformation

New Information Profile Around STEM Resources

focused, not on describing the resource itself, but on *facilitating the diffusion of the resource into educational practice and explicating diffusion patterns* as the resource is annotated, reviewed, downloaded, embedded, shared, accreted, modified, and updated.

STEM Exchange as system through which resource profiles can be collaboratively assembled and openly exchanged

by leveraging existing social networking software to create a dynamic system with *interconnected learning resources— instead of people— as the entities with rich information spaces of profiles, friends, groups, and status updates*

"Paradata"

- a complement to metadata, not a replacement
- separate layer of information from metadata
- a means to automate information generation about resource use by using social networking tools
- a means to create an open source and open access data space around resources
- emphasizes dissemination rather than description
- accommodates expert and user-generated knowledge
- powers feedback loops
- explicates usage patterns and inferred utility of resources

STEM Exchange Web Service
RESOURCE PROFILE – CORE ELEMENTS

Resource ID:
Short human-readable identifier unique to each resource profile

Metadata:
One or more descriptive records from one or more resource providers

#resource

RESOURCE PROFILE
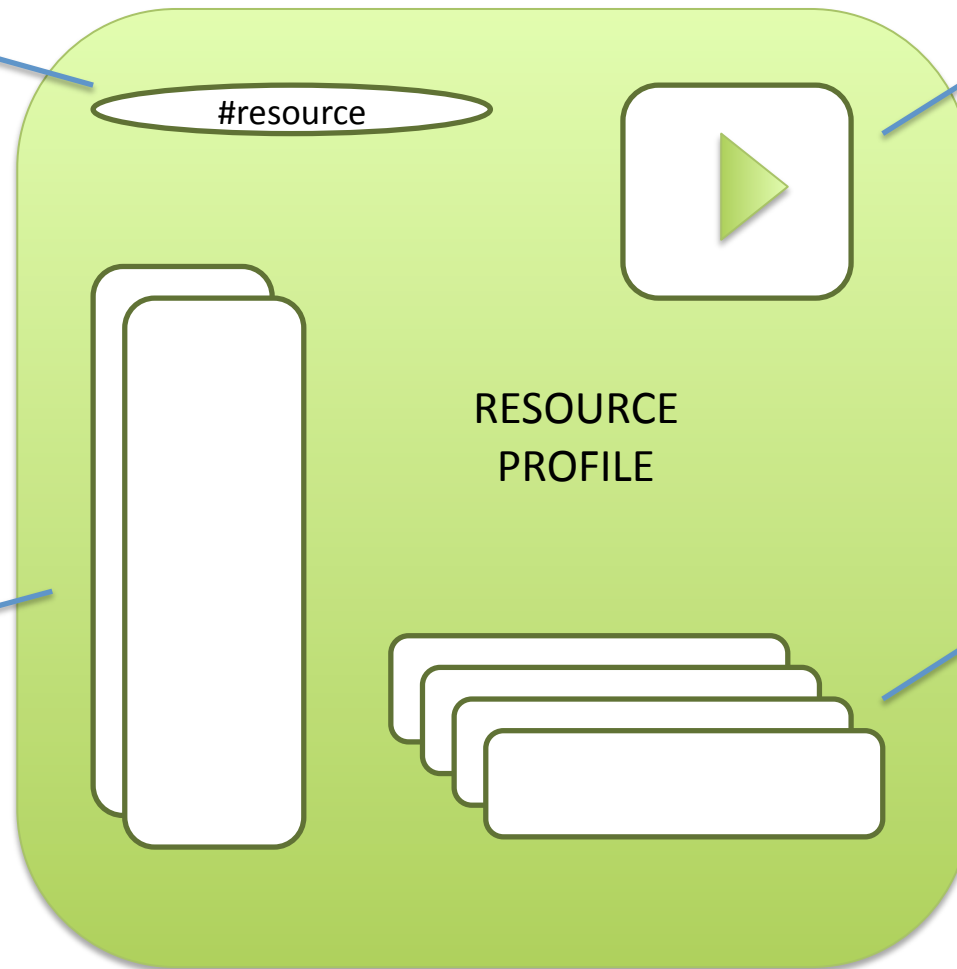
Direct Access to Content:
Preview, download, or embed functionalities as appropriate to resource

Data Feeds
Favoriting, curriculum alignments, usage notes, and other associations from user communities

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STEM Exchange Workflow: Version 1, 3/22/10

DATA FLOW THROUGH THE STEM EXCHANGE

R E S O U R C E   P R O V I D E R S

U S E R   C O M M U N I T I E S

RESOURCE DATA →

-Metadata
-Content files
 (e.g., PDFs, Flash files, embed codes)
-Associations
 (e.g., relationships to other resources)

DATA EXCHANGE

RESOURCE DATA →

-Rich resource information
-Access (e.g., download, preview)
-IDs to reference profiles

← **RESOURCE PROFILE DATA**

-Paradata that captures how resource is being used
-Profile usage data including number of hits or downloads

← **COMMUNITY-GENERATED DATA**

-Connections to lessons and curriculum, mappings to standards, and other user-defined associations

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What We've Heard from Stakeholders

Interest in…

- social media style access to NSDL resources
- potential to enhance dissemination of resources
- adding practitioner context to resources
- rethinking impact metrics around how resources are being used (paradata)

- simple, flexible, customizable tool for capturing and analyzing resource paradata
- data formatting and data sharing standards for resource paradata
- cooperation and collaboration across stakeholder groups
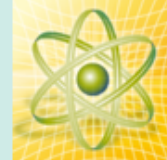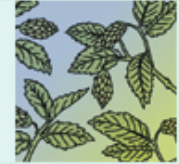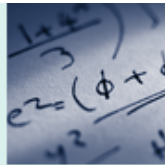
Role of Technical Network Services

- Services for discovery and delivery of the library's collections through nsdl.org and other portals
- Tools to create and manage collections of digital objects
- Web-based applications that help teachers and learners to optimize their experiences with digital content
- Services to support collaborative conversations among scientists, teachers, and students
- Support, training and consultation for the adoption and use of TNS supported tools

NSDL circa 2002

NSDL circa 201x

NSDL
resources &
services

NSDL Logic Model

Theory & Assumptions	Resources & Inputs	Activities & Processes	Products & Outputs	Outcomes & Impacts

A digital library can be integral to improvements in teaching and learning if it: provides easy access to many diverse high-quality resources, can customize them to specific learning needs, and can be integrated into the workflow of educational practice

The community-based, collaborative, distributed development of digital libraries can be productive and lead to the creation of high quality content and services customized to specific educational needs

NSDL Tracks:
Core Integration
Collections
Services
Targeted Research
Pathways

External Partners:
-publishers
-open content providers
-service developers

Create and reuse higher-quality, customized Content and Services [for User, Developer and other Partner]
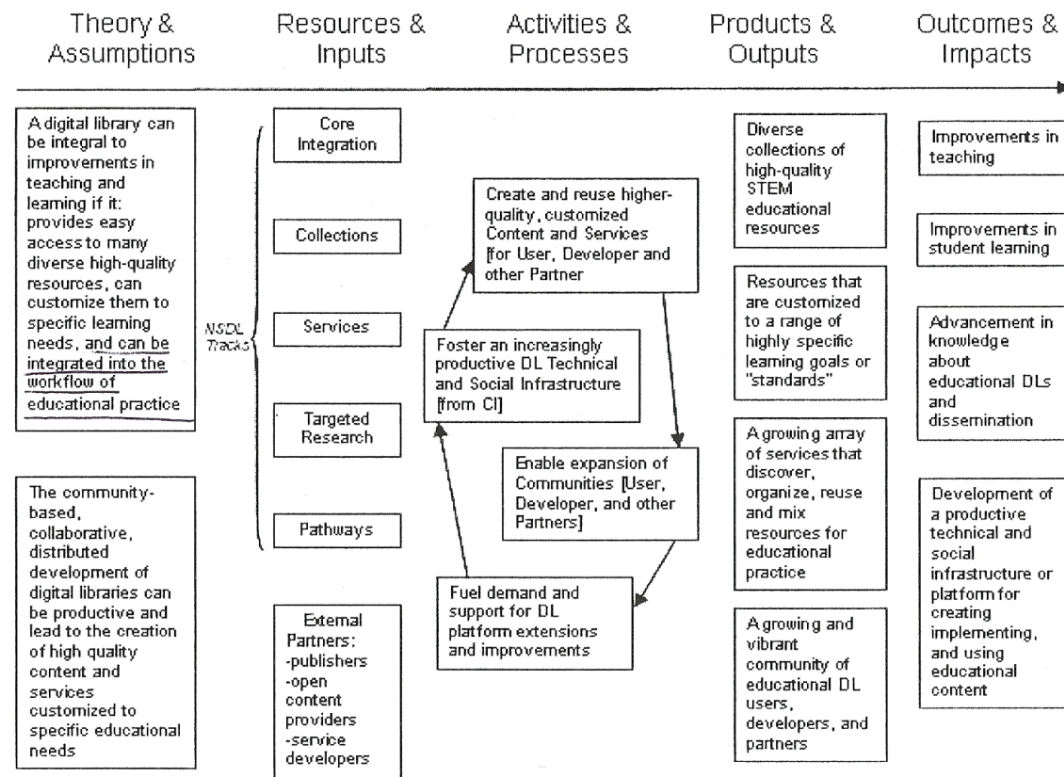
Foster an increasingly productive DL Technical and Social Infrastructure [from CI]

Enable expansion of Communities [User, Developer, and other Partners]

Fuel demand and support for DL platform extensions and improvements

Diverse collections of high-quality STEM educational resources

Resources that are customized to a range of highly specific learning goals or "standards"

A growing array of services that discover, organize, reuse and mix resources for educational practice

A growing and vibrant community of educational DL users, developers, and partners

Improvements in teaching

Improvements in student learning

Advancement in knowledge about educational DLs and dissemination

Development of a productive technical and social infrastructure or platform for creating implementing, and using educational content
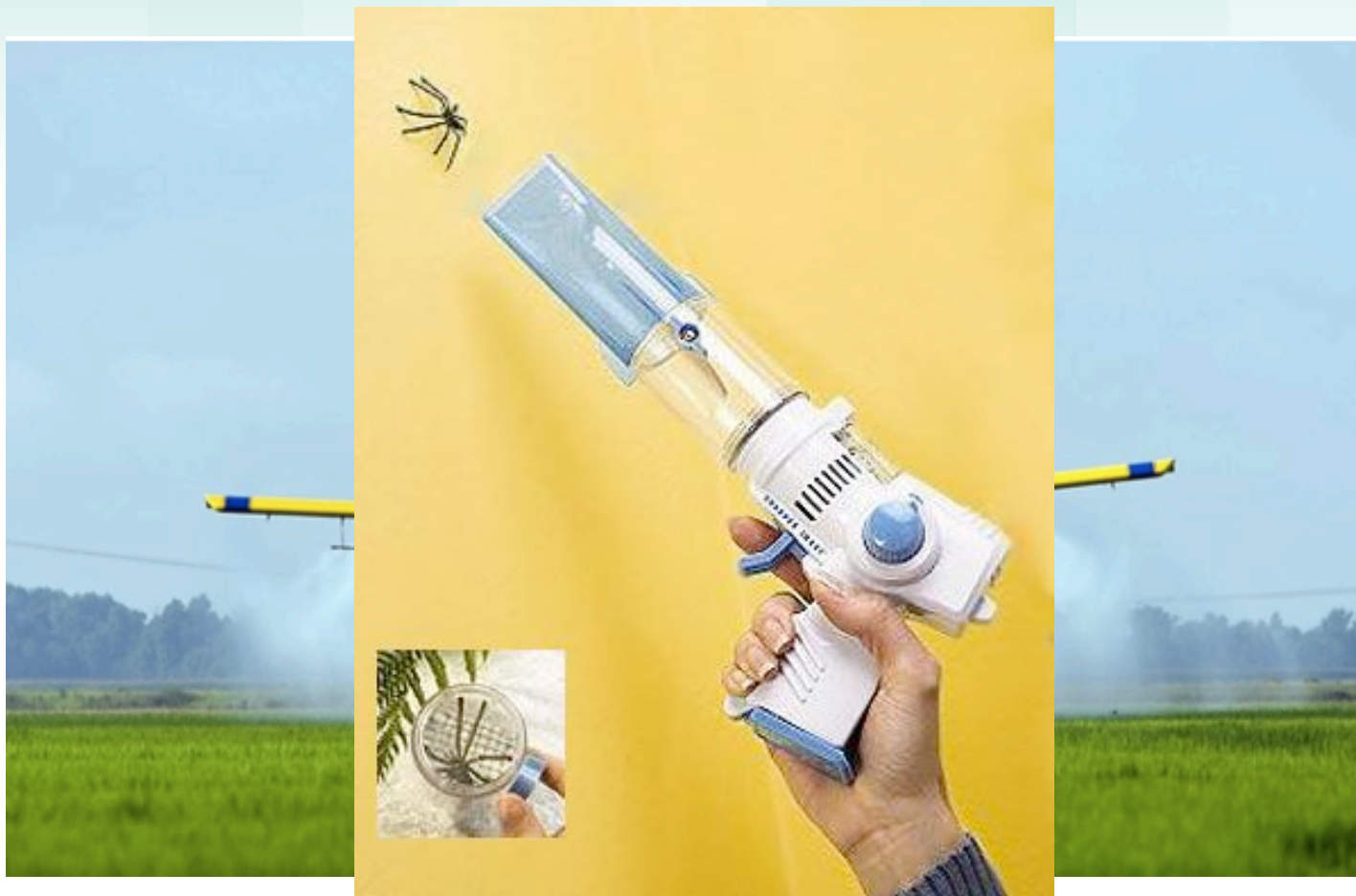
Messages from 2009 Reverse Site Visit

NSDL

From infrastructure development to deployment…

downloads

From general portals to embedded applications…

If we build it they will come

We will build it and bring it to them

What comes next

- Review of 2009 accomplishments
  - Tammy Sumner
- Plans for the year ahead
  - Mike Wright

NSDL
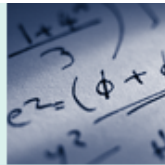
Technical Network Services - 2009

Carl Lagoze, Cornell University
Tamara Sumner, University of Colorado
Michael Wright, UCAR

Strategies & Resource Alignments

Project management and administration	1.5 FTEs
1) Maintain and operate the technical infrastructure	**4.7 FTEs**
2) Mobilize the community	**3.5 FTEs**
3) Support educational exemplars	**2 FTEs**
4) Improve NSDL.org user experience	0.5 FTE
5) Evaluation	0.3 FTE
6) Extend strategic partnerships	As needed

NSDL

Major Accomplishments of TNS in 2009

Strategic Goals Being Met	Key Outcomes	Evidence of Efficacy and Impact

Goal 1: Operate the NSDL technical infrastructure and streamline operations for long term sustainability
 	
Goal 4: Improve the NSDL.org user experience
	• Completed major collections streamlining
	• Continued HW/SW streamlining
	• Improved virtualization and hosting
		• Significantly improved alignment between collections and audience
		  o Pre/Post collection content analyses
		  o NSDL.org user audience survey and improved web analytics
		• Seven fold increase in hosting services to grantees with no additional FTEs

Goal 2: Mobilize the NSDL community to position NSDL as premier distributed cyberlearning platform	• Significantly ramped up platform technical support, services, and training
	• New "reverse visit" model for mini-summits
	• Semi-structured interviews with 16 grantees in 8 projects on TNS services
	• Initiated Roadmap technical planning process
	• Provided technical support to RC to develop NSDL Community Site
	• Secured continued access to strategic service: Content Assignment Tool (CAT)
		• Significant increase in platform adoption
		  o From 3 to 19 community groups
		  o From 125 to 311 EduPak downloads
		  o Trained approx 50 people from NSDL, CCLI, NASA, and AAAS
		  o Saves grantees effort and expense, strong levels of service and support
		• Major releases and key agreements
		  o TNS Roadmaps - Jan 2010
		  o NSDL Community Site - Oct 2009
		  o Syracuse University to support CAT

Goal 3: Support educational exemplars Goal 5: Extend strategic partnerships	• Validated "embedding" model for promoting mainstream K-12 use and NSDL Logic Model • Extending school district deployment site network • Improving platform support for exemplars: NDR API 2.0 and Science Literacy Collection	• Denver Public Schools Field Trial Results (124 teachers) and RAND Site Visit • Districts on board: DPS, Douglas (CO), Davis (Utah), St. Vrain (CO)

G1 Infrastructure & G4 User Experience

- **Objective:** Streamline infrastructure to improve operations and hosting

- **Evidence:** Seven-fold increase in community hosting services without additional FTEs

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- **Objective:** Streamline collections and align to audience

- **Evidence:** From 2 million to 133,000 items
  - Pre/Post Analysis
  - NSDL.org audience survey

NSDL

Pre/Post Collection Analysis
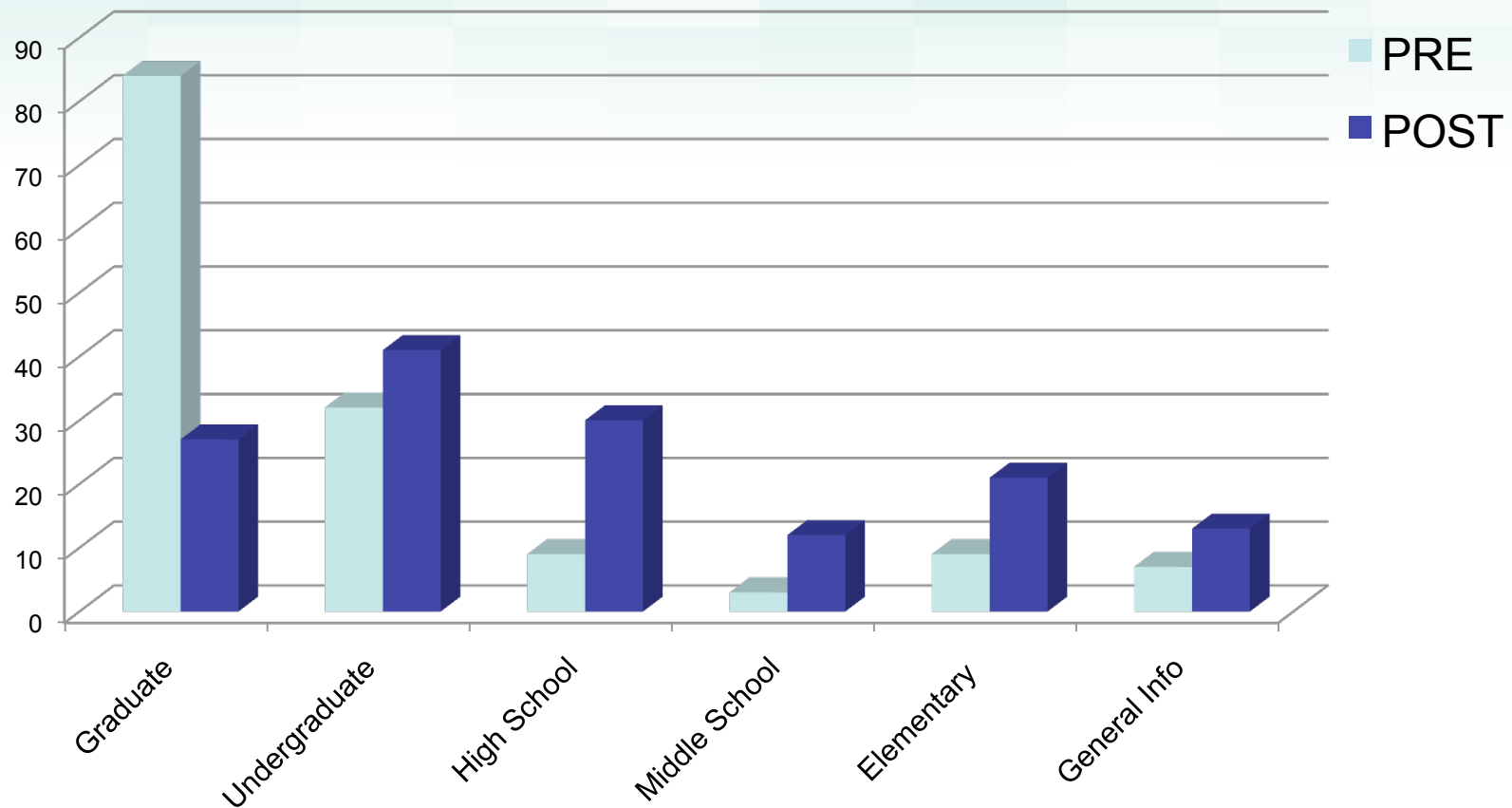
Pathway resources more than doubled

Improved Alignment to Audience

Who uses NSDL.org?
- Educators (56%) and students (23%)

What grade levels?
- High, Undergrad, Middle

What are they doing?
- Looking for resource to teach (35%)
- Furthering own knowledge (17%)

Were they successful?
- Very - 42%, Somewhat - 42%, No - 5%
- Complexity, Student-facing content

Hide User Survey

We appreciate feedback from users. Please respond to these few questions to assist us in better meeting your needs.

Please indicate your zip code: [   ]
Or check here if not in U.S. ☐

Please identify yourself as primarily:
- ○ Educator/faculty   ○ Librarian
- ○ Student   ○ General public
- ○ Parent   ○ Other

What grade level are you/do you work with?
Check as many as apply
- ☐ Elementary school   ☐ College- graduate
- ☐ Middle school   ☐ Home school
- ☐ High school   ☐ Informal education
- ☐ College- undergrad   ☐ General interest

What is your main purpose for visiting NSDL today?
- ○ Looking for a resource to teach a specific concept or standard
- ○ Looking for material to further my own knowledge on a topic
- ○ Completing a homework assignment
- ○ Just browsing

519 responses; about 13%

NSDL

G2: Mobilize Community/Platform Support

- **Objective**: Engage community in technical planning and co-development

- **Evidence**
  - Roadmaps released
  - Community contributions rolled back into platform

- **Objective**: Ramp up platform support services

- **Evidence**: Significant increase in platform adoption (6 fold increase)
  - Grantee interviews on TNS services

NSDL

MGR - Metadata Editor

Home Search Manage NDR Settings Services Help

MGR
User: jweather | logout

EduPak
NSDL Collection System

Metadata Editor

Middle School Portal 2 ➡ MSP2-000-190-145-548

| **General** | Lifecycle-Rights | Educational | Coverage |

Save record | Validate page | **?** | Change status | **Edit** View record | Exit

General
best practices

recordID MSP2-000-190-145-548
best practices

recordDate 2010-04-22
best practices

url http://illuminations.nctm.org/ActivityDetail.aspx?ID
best practices

title Mean and Median
best practices

description
delete
best practices

This applet allows students to invest
whisker plot for a set of data that
to 15 integers, each with a value fr
challenge students to invent sets of

add description

keyword add keyword
best practices

▼ *subjects*
best practices

Search - Middle School Portal

MSP2
Middle School Portal 2
Math & Science Pathways

— **Online Social Network** —

Main   My Page   Members   Events   Groups   About   Search   Forum   Blogs

Search

Search MSP2 Digital Library

mean and median   Search

Quick Search:

Mathematics

- All Records
- Real World Applications
- History of Mathematics
- Assessment Ideas
- Games
- Simulations
- Problem Sets

Science

- All Records
- History of Science
- Global Climate Change
- Assessment Ideas
- Laboratory Safety
- Misconceptions

Results 1 - 10 out of 23

Mean and *Median*

This applet allows students to investigate the *mean*, *median*, and box-and-whisker plot for a set of data that they create. The data set may contain up to 15 integers, each with a value from 0 to 100. The Exploration questions challenge students to invent sets of data that satisfy given criteria.

From: Middle School Portal 2
Resource Types: Instructional Material, Activity, Simulation

Welcome to
Middle School Portal

Sign Up
or Sign In

About

MSP2 Middle School Portal
created this Ning
Network.

Create a Ning Network! »

Resources for
Math/Science

Triangles Online

Ratios as Seen in Scale
Factors

Linking Math to Real Problems

More...

Connecting News to
National Science
Education Standards

We Are All Connected to the

Metadata Editor (browser window)

URL: http://howtosmile.org/ncs/editor/edit.do?command=edit&recId=smile-000-000-000-358

SMILE Local NCS - Metadata Editor

Home Search Manage Settings Services Help

SMILE Local NCS
User: kginger | logout

SMILE PATHWAY
NSDL Collection System

Metadata Editor

SMILE ➡ **Go With the Flow** (smile-000-000-000-358)

| **Activity Basics** | Authorship, Rights | Cost, Time, Materials | Diversity | Place and Time |

| Save record | Validate page | ? | Exit | | Edit | View record |

ActivityBasics NOTES:
- Items in red are required,
- Read the introduction to

- preview this record
- expand all | c

recordID   smile-000-000-000-358

title   Enter the resource **title** (require
Guidelines   Go With the Flow

subtitle
Guidelines

url   Enter the **URL** for the page that
Guidelines   http://www.exploratorium.edu/s

fileType   Web page

▶ relatedUrls   Enter **relatedURLs** for compon
Guidelines   For standards or assessments

standardsUrls   add standardsUrl   If resource is
Guidelines   You can incl

Search Results | SMILE Pathway (browser window)

URL: http://howtosmile.org/resourcesearch?verb=Search&ddssearch_q=turbulent+flow+of+water

Home   About   Participate   Help   Join SMILE   Member Login

SMILEPATHWAY BETA
ALL THE BEST ACTIVITIES IN ONE SEARCH

Q Search
Advanced Search

Member Login

Username or email:*

Password:*

Log in
Create new account
Forgot Password?

Your Filters: clear all

Search Term: turbulent flow of water

Narrow Results By:

▼ **Age Range**
4-6 years old (PreK-K) (23)
6-8 years old (grades 1-2) (41)
8-11 years old (grades 3-5) (53)
11-14 years old (grades 6-8) (33)
14-18 years old (grades 9-12) (16)

Feedback

Results   Showing 1-10 of 64 records:

Go With the Flow
In this activity, learners will observe laminar and turbulent flow of water using only a plastic bottle, liquid hand soap, food coloring and water. Normally, you can't see how ...
☆☆☆☆☆ (0 Comments) $1 - $5 per group   Ages 4 - 11   10 to 30 minutes
Go to Activity ▶
SMILE Details
Login to add resources to lists.

Breathing Yeasties
Does yeast breathe? Find out by watching how plastic bags filled with yeast, warm water and different amounts of sugar change over time. Demonstrate the interaction of ...
☆☆☆☆☆ (0 Comments) $1 - $5 per student   Ages 6 - 14   45 to 60 minutes
Go to Activity ▶
SMILE Details
Login to add resources to lists.

Water Pressure Blaster
In this experiment (pages 1-3 of the PDF), learners apply pressure to a water bottle (i.e. "push" on the water) to determine how the area of a hole affects the force of the ...
☆☆☆☆☆ (0 Comments) $1 - $5 per group   Ages 8 - 11   45 to 60 minutes
Go to Activity ▶
SMILE Details
Login to add resources to lists.

Other Examples of Platform Adoption

- Engineering Pathway – helping them to rebuild from the ground up
  - A sign of things to come as projects prepare for sustainability?

- California County Educational Technology Consortium
  - 17 Counties; 1 million students
  - Use EduPak to develop repository and Curriculum Customization-like services

NSDL

Perceptions of TNS Services

- Semi-structured interviews with 16 people from 8 groups
- What tools and services do they use and why? Do they help you meet your project goals?
- Issues and barriers with TNS tools and services?
- Priorities and interests in coming year?

Results – What do you use and why?

- Mostly collection development services
- Efficiency, may lack in-house technical support, make their dollars go farther

" I think the clear aspect was a savings in cost and time. And that was, you know, of course the primary motivation, so we can stretch our dollars further for actual stewardship of the community. And of course, we wanted to be part of the NSDL and be seen as an example of how a pathway can start relatively quickly without having to worry about the infrastructure so much. So we both wanted to be a test case for future pathways, and we wanted to make sure the development of X Pathway went smoothly and quickly, and that's why we went – and of course, you know, it helps that TNS is around and is composed of such great people to offer technical support."

Results – Issues and Barriers

- Have own tools; don't want to be guinea pigs or test cases

- Lack of awareness of available tools and services

- Usability of NCS – need a more user friendly approach for casual catalogers

- Development cycles out of sync (they want it now)

NSDL

Results – Help meet your project goals?

- **YES! Saves them effort and expense and enables more investment in product**

- **Additional goals seeking support for:**
  - More technical guidance and best practices on setting up their own services
  - Outreach and evaluation (not really expecting TNS support here, more RC)

- **Better communication, difficult to find roadmaps, need more prompting**

NSDL

G3 Edu Examplars & G5 Partnerships

- <u>Objective:</u> Develop and validate model for embedding in mainstream K-12

- <u>Evidence:</u> Denver Public Schools field trial (n = 124) and RAND site visit

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- <u>Objective:</u> Extend school district deployment site network

- <u>Evidence:</u> Four districts now on board: DPS, Douglas County (CO), Davis (Utah), St. Vrain (CO)

NSDL

Curriculum Customization with Denver Public Schools

Created with EduPak and the Strand Map Service

Screen 1: Unit 2: Earth's Dynamic Geosphere — Plate Tectonics

Complete survey | Welcome Lynne | Logout | Home

My Workspace (8)

Plate Tectonics is the result of matter and energy flow in the Earth which causes specific topography.

Volcanoes | **Plate Tectonics** | Earthquakes

Units of Study » Unit 2: Earth's Dynamic Geosphere: Plate Tectonics » Interactions of Plates

Key Concepts
- a. GPS Technology
- b. Modern Theory
- c. Plate Boundaries
- d. Earth's Layers
- e. Plate Motion
- **f. Interactions of Plates**

The interactions of plates at their boundaries create specific landforms such as trenches, mountains, volcanoes, island arcs, rift valleys, and mid-ocean ridges and explains the global pattern of earthquakes.

- g. Physical Evidence

Interactions of Plates

EarthComm Activities | Interactive Resources | Education Standards | My Stuff (1)

Activity 4

Plate Tectonics: Activity 4: Effects of Plate Tectonics
http://ccs.dls.ucar.edu/protected/iat/earth_dynamic_geosphere/chap02/e...

Page: G 95
Number of periods: 2.0

Classroom activity

This activity uses maps to discover the relationship among plate tectonics and earthquakes and volcanoes. Students will model: 1) the rise of magma through the Earth using honey and vegetable oil, 2) subduction and accretaion using cream cheese and cheese... hypothesize about...

Keywords: Sea-floo... Mountains at plate...

From: EarthComm Activ...

- ▶ My Stuff for this Activity (2)
- ▶ Key Concepts for this Activity (1)
- ▶ Instructional Support Materials (4)
- ▶ Teaching Tips (5)
- ▶ Student Conceptions (1)
- ▶ Embedded Assessments (4)

Screen 2: Unit 2: Earth's Dynamic Geosphere — Plate Tectonics

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My Workspace (7)

Plate Tectonics is the result of matter and energy flow in the Earth which causes specific topography.

Volcanoes | **Plate Tectonics** | Earthquakes

Units of Study » Unit 2: Earth's Dynamic Geosphere: Plate Tectonics » Interactions of Plates

Key Concepts
- a. GPS Technology
- b. Modern Theory
- c. Plate Boundaries
- d. Earth's Layers
- e. Plate Motion
- **f. Interactions of Plates**

The interactions of plates at their boundaries create specific landforms such as trenches, mountains, volcanoes, island arcs, rift valleys, and mid-ocean ridges and explains the global pattern of earthquakes.

- g. Physical Evidence

Interactions of Plates

EarthComm Activities | Interactive Resources | Education Standards | My Stuff (0)

Top Picks (6) | Images / Visuals | Animations | Working With Data

Plate Boundaries
http://scign.jpl.nasa.gov/learn/plate4.htm

Save

Reference
Scientific illustration

This site provides information on plate boundaries, which are found at the edge of the lithospheric plates and are of three types: convergent, divergent and conservative. Wide zones of deformation are usually characteristic of plate boundaries because of the interaction between two plates. The three boundaries are characterized by their distinct motions which are described in the text and depicted with block diagram illustrations, all of which are animated. There are also two maps that show the direction of motion of the plates. Active links lead to more information on plate tectonics.

From: DLESE Community Collection (DCC)

Plate Tectonics II: Plates, plate boundaries, and driving forces
http://www.visionlearning.com/library/module_viewer.php?mid=66

Save

Module or unit

The distribution of earthquakes and volcanoes around the world confirmed the theory of plate tectonics first proposed by Wegener. These phenomena also help categorize plate boundaries into three different types: convergent, divergent, and transform.

Keywords: earthquakes, volcanoes, subduction, convection, hot spot

From: DLESE, Visionlearning Collection

Mixed Methods Research Design

Teacher Usage, Attitudes, and Behaviors

- Demographic data
- Usage instrumentation
- Series of three surveys

- Adoption interviews
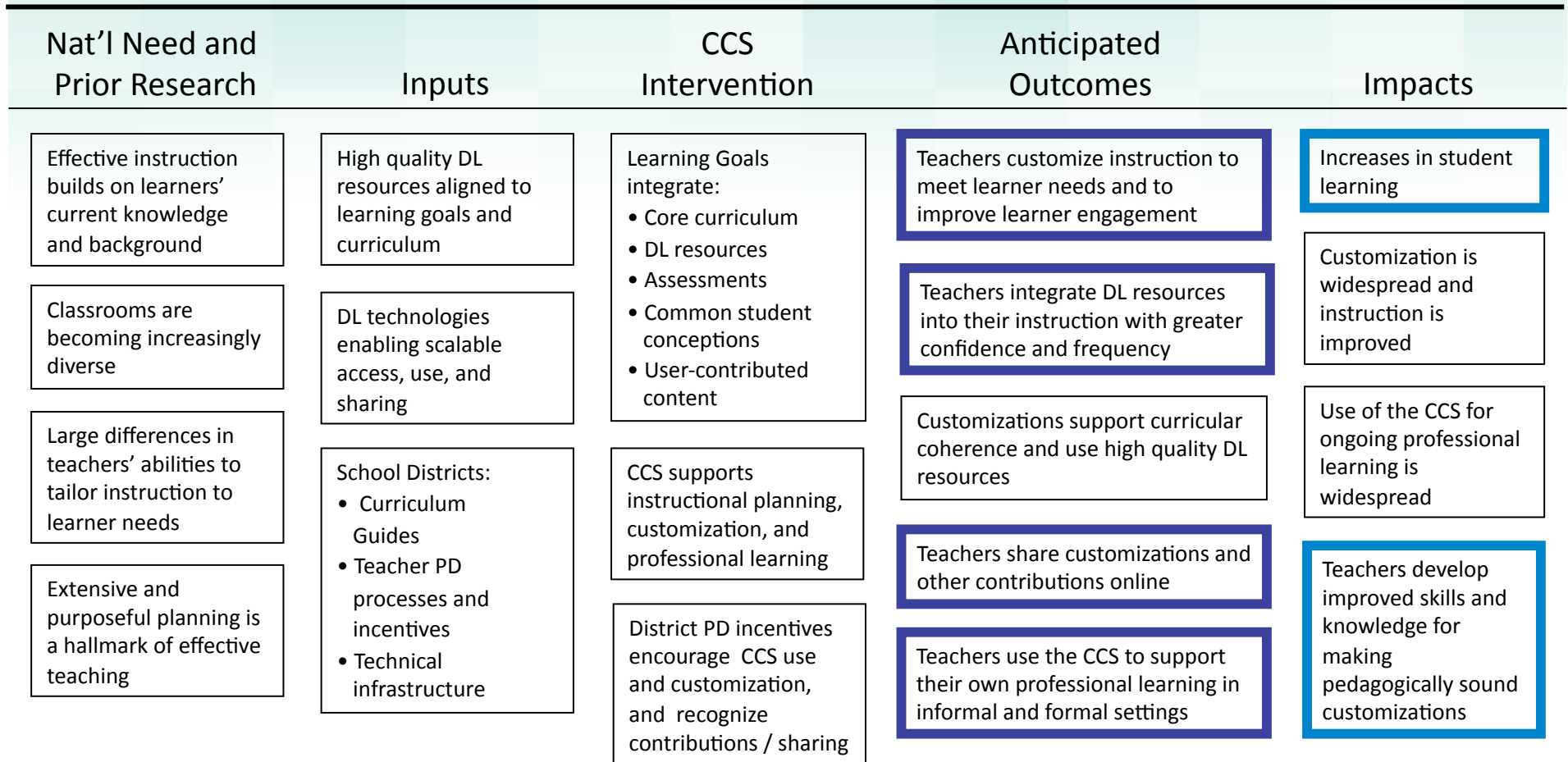- Classroom Observations
- Artifact Analysis

Teacher Learning

- Cognitive interviews

Student Learning

- District-wide, end-of-class student assessments administered by DPS

Curriculum Customization Logic Model

| Nat'l Need and Prior Research	Inputs	CCS Intervention	Anticipated Outcomes	Impacts
Effective instruction builds on learners' current knowledge and background	High quality DL resources aligned to learning goals and curriculum	Learning Goals integrate: • Core curriculum • DL resources • Assessments • Common student conceptions • User-contributed content	Teachers customize instruction to meet learner needs and to improve learner engagement	Increases in student learning
Classrooms are becoming increasingly diverse	DL technologies enabling scalable access, use, and sharing		Teachers integrate DL resources into their instruction with greater confidence and frequency	Customization is widespread and instruction is improved
Large differences in teachers' abilities to tailor instruction to learner needs	School Districts: • Curriculum Guides • Teacher PD processes and incentives • Technical infrastructure	CCS supports instructional planning, customization, and professional learning	Customizations support curricular coherence and use high quality DL resources	Use of the CCS for ongoing professional learning is widespread
Extensive and purposeful planning is a hallmark of effective teaching		District PD incentives encourage CCS use and customization, and recognize contributions / sharing	Teachers share customizations and other contributions online	Teachers develop improved skills and knowledge for making pedagogically sound customizations
			Teachers use the CCS to support their own professional learning in informal and formal settings	

Teacher Publications about NSDL Learning Applications

- Toomey, Daniel. (2010) "*Using the National Science Digital Library as an Effective Organizational Tool for Teaching Middle School Science*"; To appear in <u>Science Scope</u>; NSTA Publications.

- Miller, Jeffrey. "*Customizing Curriculum with Digital Resources*"; In preparation for submission to <u>The Science Teacher</u>, Special Issue on New Web Tools and Technology; NSTA Publications (May 1)

- Harrell, Karen. In preparation for submission to <u>Science Scope</u>, Special Issue on Models; NSTA Publications (June 1)

New Partners and Opportunities

- **Expanded School District Network**
  - Denver Public Schools, CO: 70,000 students, urban, very diverse, high needs learners
  - Douglas County, CO: 50,000 students
  - Davis County, Utah: 70,000 students
  - St. Vrain, CO: 26,000 students

- **Expanding Inquiry Curriculum**
  - Investigating Earth Systems and EarthComm; American Geological Institute/ It's About Time
  - Biology: A Human Approach; Biological Sciences Curriculum Study/ Kendall Hunt
  - Project-Based Inquiry Science; Kolodner, Krajcik, Edelson, et al/ It's About Time
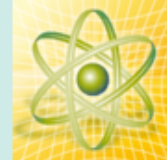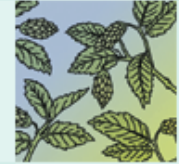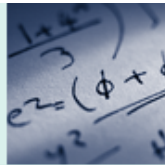
Preserving and Enhancing NSF's Investment in NSDL

1. Staging for sustainability through improved operational flexibility
2. Extending the reach of the NSDL cyberlearning platform
3. Demonstrating impact of embedded NSDL services across deployment sites and disciplines

NSDL

1) Staging for Sustainability

Improved Operational Flexibility

- Ability to shift ops to new providers quickly and at low cost
- Leverage rapidly evolving cloud computing capabilities
- Complete transition to virtualized environment
- Conduct cloud services experiment with test set of grantees and partners

NSDL

2) Extending Reach of NSDL Cyberlearning Platform

Increase breadth and depth of platform usage

- Realign developer staff to improve customer focus and technical support

- Support pathways and projects to transition to NSDL platform

  Home grown or proprietary vendor systems are difficult to maintain, end-of-life issues

  Engineering Pathway, Instructional Architect, GenderDL, Funworks

3) Demonstrating impact of embedded NSDL services

CCS has strong potential to be self-sustaining once we demonstrate replicability across sites and disciplines

- Strategically grow school district network
- Replicate Earth science-specific Curriculum Customization Service and related NSDL services across network
- Set the stage for other disciplines
- Seek external funding to conduct research on replicability and impact on student learning

Discussion