

Glimpses of a Changed Environment

*From the 2008 Project Tomorrow *Speak Up* stakeholder survey:

Students, Schools and Learning —

"It is widely accepted by students that arrival at school means 'powering down' for a few hours. After leaving school, they resume their technology-infused lives and leverage a wide range of emerging technologies to fine tune their skills in communicating, collaborating, creating and contributing."

"Technology has enabled students to be not only über-communicators, but also to develop strong teamwork skills and to view the process of content development as a key part of the new learning process."

*Since 2003, more than 1.5 million K-12 students, teachers and parents from more than 14,000 schools in all 50 states have participated in the *Speak Up* survey

Glimpses of a Changed Environment

From the 2008 Project Tomorrow *Speak Up* stakeholder survey:

Student Suggestions for the Ultimate Digital Textbook:

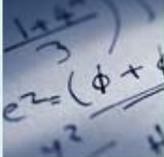
- ability to personalize their book with Electronic highlights and notes (63%)
- quizzes and tests for self-evaluation (62%) or self paced tutorials (46%)
- access to real-time data such as NASA, Google Earth (52%)
- links to power points or class lectures that support textbook content (55%)
- games (57%) or animations and simulations (55%)
- links to videoconferences (30%) or podcasts from subject experts (34%)

Glimpses of a Changed Environment

From the 2008 Project Tomorrow *Speak Up* stakeholder survey:

Free Agent Learner:

- self-directed learning
- untethered to traditional education
- expert at personal data aggregation
- knows the power of connections
- creates new communities
- not tethered to physical networks
- values experiential learning - make it real and relevant
- content developer
- process as important as knowledge



NSDL

THE NATIONAL SCIENCE DIGITAL LIBRARY

The NSDL Resource Center



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.

Resource Center Team

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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

Strategy: **Mobilize the Community**

“Effective ways to support users of materials developed by others remains an open question, especially given the complexities of the educational system. In thinking about the future of NSDL and the ways in which the NSDL investments can contribute to future cyberlearning programs, *it is important to recognize that NSDL is not simply an information technology system; it has, for example, invested in developing a powerful human and organizational network to address challenges...*”

NSF Cyberlearning Report, 2008 p.45

<i>Applied Math and Science Education Repository (AMSER)</i> University of Wisconsin, Madison FY05, FY09	Community Colleges	Applied Mathematics & Science
<i>BioSciEdNet (BEN)</i> AAAS, plus >20 professional societies FY06	Undergraduate & High School	Biology
<i>ChemEd DLib</i> Journal of Chem Ed, ACS, ChemCollective FY07	High School & Above	Chemistry
<i>ComPADRE</i> AAPT, APS, AIP/SPS & AAS FY06	Undergraduate & High School	Physics & Astronomy
<i>Computational Science Education Reference Desk (CSERD)</i> Shodor Education Foundation FY05	Undergraduate & High School	Computational Science
<i>Engineering Pathway</i> UC Berkeley, University of Colorado FY06	Undergraduate & K-12	Engineering
<i>ENSEMBLE</i> Villanova, Virginia Tech FY09	Undergraduate & High School	Computing Sciences
<i>Materials Digital Library</i> Kent State University FY06	Undergraduate & Above	Materials Science
<i>Math Gateway</i> Mathematical Association of America FY05	Undergraduate	Mathematics
<i>Middle School Portal</i> Ohio State University (FY03), FY09	Middle Grades	Science, Mathematics, & Technology
<i>Quantitative Social Sciences Digital Library</i> University of Michigan FY09	Undergraduate & High School	Demographics and Statistics
<i>Science and Math Informal Learning Educators (SMILE)</i> Lawrence Hall, Exploratorium, NYHS, ASTC FY08	Informal Education	Science and Math
<i>Teachers' Domain</i> WGBH Public Television FY05, FY09	K-12	Life, Earth, Space, & Physical Sciences

Community Working Groups

- Represent RC, TNS, Pathways, and other projects
- 2008 Metadata Working Group created new guidelines and vocabularies
- Newly launched Metrics Working Group is examining:

What are common usage and success metrics that can be tracked across projects' websites and educational activities?

What metrics tracking tools and processes can be implemented to improve efficiency?

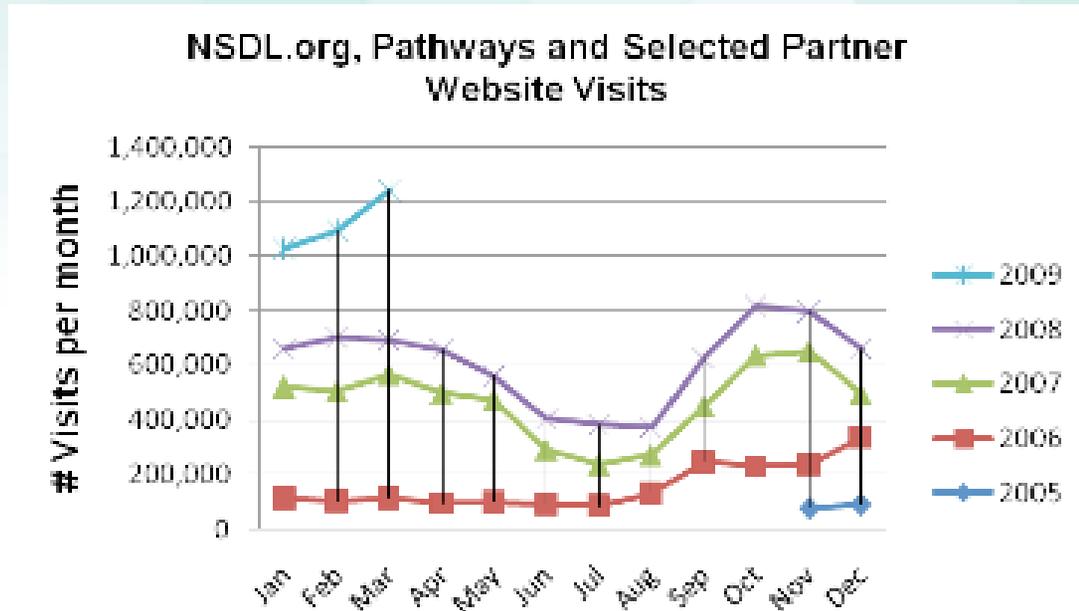
How to identify best practices and sustain dialogue as practices evolve?

- Launching a Collections Task Force

To further develop criteria for inclusion in the NSDL Collection and recommendations for educational contextualization

Strategy: Improve the User Experience

NSDL.org
ComPADRE
SERC
DLESE
CSERD
Teachers' Domain
MSP



Visits for March 2009:
1,244,646

Visits for 12 months ending
March 30, 2009:
8,664,923

Other Web Stats for NSDL.org

- Overall Internet traffic ranking (as calculated by Alexa.com) is consistently higher than NSTA.org, AAAS.org, science.gov
- 80,000 downloads from *NSDL on iTunes U*
- Beginning to track # of bookmarks to NSDL, use of NSDL's Google gadget, Twitter followers, and other Web 2.0 activity

Strategy:

Support Educational Exemplars

“It is imperative that NSF establish a coherent approach to cyberlearning to enable the transformational promise of technology for improving educational opportunity.”

NSF Cyberlearning Report, 2008 p.13

Science Literacy Maps

- Emerged from an NSDL Services Grant (Univ. of CO, UCAR, AAAS, UCSB)
- Integrated as browse interface at NSDL.org
- Maps now one of most popular sections of NSDL.org
- Core of NSDL strategy for standards alignment
- Basis for partnership with Georgia University System, Public Libraries, and Georgia State Dept. of Ed to provide customization of maps that include state standards
- Discussions with state of Massachusetts are in progress.
- Basis for partnership with NOAA, CIRES, others to use as base map for resources aligned to new Climate Literacy Frameworks

Classic Articles in Context / Timely Teaching

- Model for new relationship with scholarly publishers
- Increasing value of NSDL resources for Higher Ed audiences through additional contextualization
- Partnering with Pathways, publishers, others
- Creating packages of resources and essays centered on keystone articles and other works within a discipline (Classic Articles in Context)
- Creating ready-to-use modules and teaching tips centered on current events and articles in popular media (Timely Teaching)

Beyond Penguins and Polar Bears

- Funded through NSF- IPY
- Leverages partnership between RC/TNS and Middle School Pathway, and external organizations
- Model for contextualization of NSDL resources that connects research to classroom
- Online magazine for K-6 educators focused on polar science and early childhood literacy
- Built with NSDL tools (OnRamp, Expert Voices, NSDL Collection System)
- Testing new models for content creation, dissemination, and user engagement via Web 2.0, including original podcast series at *NSDL on iTunes U*

Strategy: **Extend Strategic Partnerships**

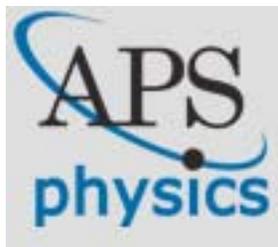
“We recommend that NSF develop a program that will advance seamless cyberlearning across formal and informal settings by galvanizing public-private partnerships and creating a new interdisciplinary program focused on establishing seamless cyberlearning infrastructure and supports.”

NSF Cyberlearning Report, 2008 p.36

Leveraging Trusted Networks



nature publishing group



Member States

- | | |
|-----------|----------------|
| Alabama | Mississippi |
| Arkansas | North Carolina |
| Delaware | Oklahoma |
| Florida | South Carolina |
| Georgia | Tennessee |
| Kentucky | Texas |
| Louisiana | Virginia |
| Maryland | West Virginia |

Leveraging the NSDL Network

- Pathways and their immediate partners represent:
 - 25 universities
 - 39 professional societies
 - 6 science centers
 - 3 educational foundations
 - 27 educational organizations
 - 8 research organizations
 - 1 public television station
- Pathways collaborate, advise, and share tools and technologies with each other and other NSDL projects (inventory underway)
- Resource Center brokers partnerships and opportunities with external entities for the benefit of the whole NSDL community

Leveraging Across NSF Programs

Examples:

- NSDL in CCLI solicitation as recommended dissemination channel
- AMSER as ATE Resource Center
- CSERD as TerraGrid outreach
- ComPADRE cataloging CCLI materials
- SMILE connected to CAISE (ISE Resource Center)
- Collaborations with OLPA, NSF Research Center Educators Network (NRCEN)
- Awareness building with Einstein Fellows, CAREER, ITEST, HBCU, MSP, others

Leveraging Across NSF Programs

Benefits:

- Continuity of NSDL supports use as an educational research platform
- Return on investment in NSDL technical and social infrastructures
- Knowledge and expertise of NSDL staff and projects' community
- Domain PIs not always skilled at outreach planning
- Coordinated approaches toward broader impacts

Considerations:

- Scalability given current resources
- Processes and standards to be established
- Selection and review criteria to be established
- Resource maintenance and persistence

Strategy: **Evaluation and Analysis**

“Cyberlearning has tremendous potential right now because we have powerful new technologies, increased understanding of learning and instruction, and widespread demand for solutions to educational problems.”

NSF Cyberlearning Report, 2008 p.5

Evaluation Challenges

Dual world of defining impact

Particular: Individual disciplines and audiences

General: Seeking commonalities to help focus priorities for assessing the overall impact of NSDL

Diverse use environments

- Use of NSDL largely unstructured
- Individual projects more likely to include testable educational interventions – but often small scale and idiosyncratic
- Learner vs. practitioner vs. developer, formal vs. informal
- Use of digital materials in classrooms is rapidly evolving
- Tension between authority-driven and self-directed use of digital materials

Coherency of evaluation across multiple scales

- NSDL as an NSF program
- NSDL as a community of projects
- NSDL as a technical platform
- NSDL as a digital learning environment
- NSDL.org as a website
- NSDL as a collection of resources
- RC and TNS as coordinating entities
- Individual NSDL projects, tools, services

Diverse projects with different degrees of readiness

- Varying audiences, goals, purposes, resource offerings, levels of staffing, levels of funding, stages of maturity, prospects for sustainability

Resource Center Evaluation Efforts

Focused on community mobilization, facilitation, and synthesis rather than conducting program-wide evaluation...

- Audit of Pathways' current and planned evaluation efforts
- Audit of collaborations among Pathways and other projects
- Metrics Working Group
- Roll-up report of RC outreach and dissemination data
- Project Tomorrow as partner for understanding user needs
- Facilitating community dialogue and resource sharing
- Emphasis for next annual meeting and potential future workshops

Examples of Projects Current' Evaluation Efforts



SMILE

- Understanding user needs



Middle School Portal 2

- Implementing a formal logic model; social networking analysis



Teacher's Domain

- Leveraging other funding sources to address impact on teachers and students



Curriculum Customization Service

- Evaluating impact of NSDL at the scale of a large urban school district (Denver Public Schools)

Analysis - Lessons Learned

- Start where users are, understand that, and stay responsive to changing needs and realities
- Be cognizant of where NSDL projects are, and build structures that support their forward movement
- Leverage trusted systems and capitalize upon trusted brands
- Leverage the NSDL community
- There are still significant technical and policy barriers to the use of technology in K-12

- K-12 teachers and university faculty need continuing support in the volatile world of digital resources and approaches to today's learners
- Neither an abundance of resources nor one gateway portal are the point – transformation depends on quality, contextualized resources, and feedback loops on use and effectiveness
- To have genuine impact, digital resources should be imbedded in educational work flow
- NSDL is well positioned as a link and broker between K-12 and higher education

Open Questions

- How to increase significant usage and adoption
- How to scale contextualization
- Ubiquity of web + realities of distributed and complex education system – how to achieve excellence
- Sustainability
 - “Recommendation 5 – Take responsibility for sustaining NSF-sponsored cyberlearning innovations” (p.7, NSF Cyberlearning Report, 2008)*
- Connecting to the learning sciences research community
 - “Both Cyberinfrastructure and the learning sciences are areas of high priority and significant investment for NSF, yet little attention has been paid to the productive intersection between them.” (p. 13)*
- Evaluating Impact

“Many of these challenges [facing NSDL] arise from juxtaposing the formal education system, which is shockingly resistant to change, with the Internet, which is shockingly able to undergo radical transformations on a moment’s notice. Life at the interface of these differently-paced worlds can instill a professional version of manic depression. Ideas intended to radically improve education most often end up having incremental impacts.”

David Yaron, 2008

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