



**Poster Abstracts**  
**Annual Meeting 2010**

**Washington, DC**  
**November 1 – November 3, 2010**



## ***New Projects***

**The Concord Consortium Collection:** The Concord Consortium Collection will bring a wide variety of new free and open source STEM materials into the NSDL. These materials feature interactive computational models and interaction with probes and sensors. Many of these materials collect and report on student use, and we are thus able to measure their impact directly. In addition, the Concord Consortium Collection will develop a tool enabling assessment prompts to be embedded together with launched activities, permitting teachers to convert Web-based activities into assessment opportunities and increasing the potential for measuring the impact of other NSDL resources.

*Poster Authors: Chad Dorsey, Carolyn Staudt, Stephen Bannasch and Cynthia McIntyre*

**ICPALMS: An NSDL Pathway for Standards-based Instruction:** The ICPALMS pathway at the Florida State University is designed to provide a widget-based portal into content, services, professional development, research, and dissemination that will result in a scalable, sustainable infrastructure to support individual and collaborative standards-driven instructional planning with K-12 NSDL resources. It will include standards-based planning tools that recommend relevant digital resources just-in-time and continuously through a widget-based and collaborative platform. ICPALMS will integrate within the context of teacher practice in Florida, as a test bed, including rigorous alignment with state content standards, but transition to use the Common Core Standards. Teachers will collaborate with other teachers, library media specialists, content specialists and school leaders to create effective plans that integrate NSDL resources. ICPALMS will contribute K-12 resources to NSDL. These resources are recommended or created by educators. All resources are vetted through a rigorous review process that involves teams of content, pedagogy, and practitioner experts to ensure that tools, services and the connected content are standards-based, reflect appropriate levels of cognitive complexity and utilize evidence-based instructional strategies tied to improved student outcomes. ICPALMS will help NSDL realize its vision to attain deep and meaningful integration into educational practice. ICPALMS meets challenges repeatedly cited as barriers to wider digital library use, by providing a system to enable educators to wed high quality resources, vetted by experts, with time saving planning tools. ICPALMS will make accessing and implementing digital resources relevant in the day-to-day roles and responsibilities of educators. Integrating the Common Core and other national standards will facilitate expanding implementation and expandability into other states.

*Poster Authors: Laura Lang, Rabieh Razzouk, Marcia Mardis, Danielle Sherdan, Mabry Gaboardi*

**Teacher Creativity at the Intersection of Content, Cognition and Digital Media:** This approach draws teachers into the process of using tablet computers both to produce short (2-4 minute) digital videos (without using cameras) that teach mathematical ideas and to create more usable implementations of media that currently reside in digital repositories. Short instructional videos such as those posted on YouTube have proven successful in helping students learn or reinforce mathematics and other subject areas. This project extends far beyond the benefit of such videos. We focus on the process of teachers changing as they create digital media as much as on the benefit of having the videos. When teachers practice the craft of video production, their level of reflection, clarity and attention to possible misunderstandings leaps dramatically. This approach seeks to elevate the role, responsibility, satisfaction and expertise of teachers. The approach is still experimental, but it can authentically be considered a paradigm shift in teacher professional development.

*Poster Author: Eric Hamilton*

**Learning About NSDL Resources in an Integrated Learning Environment for Mechanics:** We are incorporating NSDL resources including videos, worked examples, simulations, and tutorials into an Integrated

Learning Environment for Mechanics (ILEM) where they are combined with multi-level research-based homework sets and an open-access WIKI-text. ILEM is hosted in the LON-CAPA open source online learning environment. We are in the process of developing psychometric assessment tools designed to calibrate and evaluate assessment and instructional items. We will make student feedback as well as automatically generated metadata about the items available to authors of NSDL content so that materials can be improved. In this environment, a user-ranked asset window will direct students towards additional resources, many from NSDL, and allow us to evaluate the learning efficacy of those resources. We are implementing ILEM in introductory calculus-based mechanics courses at MIT and Whatcom Community College (Seattle). We welcome collaborators; those who wish to evaluate their material, and users - even ambitious ones wanting to extend our techniques to other subject areas.

***Poster Authors: Analia Barrantes, Carolin N. Cardamone, Saif Rayyan, Raluca E. Teodorescu and David E Pritchard***

**Targeted Research for A Serious Games Pathway:** The Educational Gaming Environments group EdGE) at TERC has just been awarded a targeted research grant to study the affordances and barriers to dissemination of scientific digital resources through STEM gaming environments. EdGE will create a prototype transmedia game about an environmental crisis that compels the public to get active both virtually and in reality and provides a new audience for scientific data, images, and tools.

***Poster Authors: Jodi Asbell-Clarke, Teon Edwards, Jamie Larsen (EdGE@TERC)***

**Ubiquitous Contextual Access to STEM Educational Resources (UCASTER):** This new NSDL project will allow users (teachers, students, the public) to find NSDL resources related to content they are viewing on a web page and that is relevant to their grade level, classes, and other information stored in a personal profile. It will additionally track usage and traffic in social networks with the intent of informing users when classmates or friends have recently viewed or discussed the same topics. This "poster" will show early working demos of this technology and explain the project in more detail.

***Poster Authors: Robby Robson, Jennifer Waletich, Ronald "Fritz" Ray***

**NSDL Project Finder:** NSDL Technical Network Services and the AMSER Pathway are creating a new service for the NSDL community—The NSDL Project Finder. The Project Finder will help make information about NSDL projects available to broader audiences and enables PIs to publish, disseminate, and update basic information about their NSDL funded projects. The first iteration of the Project Finder uses data harvested directly from the NSF awards database and makes it available for updating by project PIs or staff through an easy to use interface. Available for the first time at the 2010 PI meeting, this initial set of records will allow the community to provide TNS and AMSER staff with feedback on the metadata being collected and discuss ways this new tool could be used by the larger NSDL community to help with collaboration, reporting, and data sharing.

***Poster Authors: Rachael Bower, Ed Almasy and Karon Kelly***

**From Digital Library to Community of Practice: Upgrading the Interactivity and Impact of an Established**

**DL:** The American Physiological Society (APS) Archive of Teaching Resources is a collaborative digital library project involving seven scientific societies that can be searched through the Archive, the BEN portal, NSDL, and Internet search engines. With new support from NSF/NSDL the Archive will expand to create a Community of Practice (COP) where educators not only contribute and share teaching materials but also provide feedback, ratings, and recommendations of sets of Archive materials that they have used. Existing Archive Partners (Society for Developmental Biology, Human Anatomy and Physiology Society, National Association for Health and Science Education Programs) will be joined by new partners (Northwest Association for Biomedical Research, American Association of Anatomists, Massachusetts Society for Medical Research) in further expanding the user and resource bases at the high school, community college and college/university levels. New evaluation and sharing tools will promote participation in the Archive COP. A new Archive Scholars program for educators will provide online training to both promote community building and enhance the practice of teaching. Ultimately, the goal of this Archive COP is to impact scientific education and learning by fostering a community where scientific educators can collaborate and improve on their pedagogy.

***Poster Author: Marsha Lakes Matyas and Miranda Byse***

**Connecting Knowledge Exchange Networks to Sustain the MathDL Developmental Mathematics Collection:**

The MathDL Developmental Mathematics Collection began in 2010 as an outgrowth of a regional collaboration across community colleges in the San Diego region. To enhance and sustain the initial Collection, we are linking together collaborations across colleges within California's large urban regions, to create a Knowledge Exchange Network for Developmental Mathematics. We plan to extend the model to additional state and regional partners, and to other areas of mathematics. The emerging *Knowledge Exchange Network is supported by strong social and technological infrastructures. Each of the 20 colleges who are currently participating selects a departmental Catalyst as the liaison between the faculty of their mathematics department, the regional collections, and the NSDL collection. All the regional Knowledge Exchanges (and potentially some departmental collections) are hosted by the open source platform Curikki.org. The plan to sustain the NSDL collection involves promoting exemplary resources from departmental to regional and then the national collection, based on experience of other faculty and on evidence of student success in new contexts. A professional development program will support faculty in providing the pedagogical content knowledge required for re-use and adaptation beyond their college, and to integrate access to the regional and NSDL collections within their departmental repositories.*

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**Mathematical Communication Space: Resource for Educators:** The M.I.T. Department of Mathematics is partnering with MathDL Pathway to create an online teacher's resource for teaching mathematical communication in undergraduate math classes. An experimental version of this resource at M.I.T. currently provides advice for structuring communication-intensive math courses, for teaching mathematical writing and presentation, and for addressing issues that commonly arise in communication-intensive math courses. The resource also offers a venue for discussion so the content may be collaboratively refined over time. The resource at MIT was developed using Wordpress, an open-source blogging and publishing platform, and is extremely flexible and extensible. The NSDL Small Grant will be used to refine the M.I.T. site to the point at which it can be shared with other institutions via the national MathDL Pathway. In particular, we will assess and improve the usability of the site; review and integrate existing literature into the site's current content; automate transfer of metadata from the Wordpress site to NSDL; and encourage innovation by enabling institution-specific private sites to interact with the nationally available public resource. The new national site,

the Mathematical Communication Space, will be hosted by the Mathematical Association of America's MathDL Pathway.

*Poster Authors: Haynes Miller, Violeta Ivanova, and Susan Ruff, Massachusetts Institute of Technology*

## **Pathways**

**AMSER: The Applied Math and Science Education Repository:** AMSER (the Applied Math and Science Education Repository) is an NSDL pathways project aimed at connecting Community and Technical Colleges to the NSDL. The AMSER portal showcases a variety of applied math and science resources of special interest to this audience along with services to help collect and share select resources with others. Two publications, the AMSER Science Reader Monthly and the AMSER Quarterly help promote the materials in AMSER and provide resources in context for use in the classroom. AMSER received initial funding in 2004 and a second round of Pathways funding in 2008. Initially a supplement to AMSER, ATE Central is a sister site that brings together resources from and information about the Advanced Technological Education projects.

*Poster Authors: Rachael Bower and Edward Almasy*

**ChemEd DL: Digital Resources for Chemistry Teachers and Students:** ChemEd DL, the Chemistry Pathway in the NSDL, has a broad range of resources for teachers and students. These range from online, collaborative textbooks, through large collections of videos, quiz/homework questions, and interactive molecular structures, to services that collect related resources and enable unique methods for finding resources. ChemEd DL is also active in collaborations with other NSDL projects and projects in other NSF programs such as TUES (CCLI). This poster summarizes the activities and collaborations of the ChemEd DL.

*Poster Authors: John W. Moore and Jon L. Holmes*

**ChemEd DL WikiHyperGlossary:** This poster describes the Chemical Education Digital Library WikiHyperGlossary (WHG), a Web-based system which automates the markup of digital text documents and Web pages in a way that connects them to online resources of ChemEd DL and beyond. The WHG is also a hyperglossary generating program and we will demonstrate several different types of glossary structures which the software can create. As a glossary is typically not used as a primary source of information but as a resource designed to help one understand a primary source of information, we have created a glossary structure option that provides the user with both authoritative definitions while simultaneously taking advantage of the dynamic nature of online resources to provide additional information. This is done by connecting two types of viewable database fields to a glossary term; a non-editable field with citations that contains the content of an established glossary, and an editable wiki-field which supports crowd-sourced content development and connectivity to varied online resources. We will also present material on our initial experiences and classroom strategy for using the wiki aspect of this tool to enhance learning in a general chemistry class at the University of Arkansas at Little Rock.

*Poster Author: Robert E. Belford, Michael A. Bauer, Daniel Berleant, Roger A. Hall and John W. Moore*

**The Climate Literacy and Energy Awareness Network (CLEAN) Pathway:** The Climate Literacy and Energy Awareness Network (CLEAN) Pathway will go live with a collection of educational resources that facilitate students, teachers, and citizens becoming climate literate and informed about "the climate's influence on you

and society and your influence on climate.” CLEAN also attempts to “close the loop” in people’s understanding of climate change and energy consumption by integrating, when appropriate, science with solutions. The focus of our efforts is to integrate the effective use of the digital teaching resources across all educational levels – with a particular focus on the middle school through undergraduate levels (grades 6-16) as well as to citizens through formal and informal education venues and communities. We will launch our first live collection during the NSDL meeting, featuring 100 reviewed teaching activities that address climate and energy science. Each record will summarize comments from both the scientific and educational reviewers in the form of teaching tips, and will include an alignment with the Climate Literacy Essential Principles and the newly developed Energy Awareness Principles. The collection building effort included the following activities: 1. Establishment of the review criteria for teaching activities 2. Establishment and implementation of a rigorous review process 3. Website development of CLEAN Pathway Portal – live site: <http://www.cleant.org> of Climate Literacy Network – live site: <http://www.cleant.org/cln> of Development of online Review Tool, Climate Literacy pages, and the CLEAN Pathway and Advisory Board workspaces In this poster we will describe the ongoing activities of the Climate Literacy Network, which is our first steps in supporting a virtual community, and provide an overview of the CLEAN Pathway Collection and process involved in establishing it.

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**ComPADRE Partnerships & Updates:** This poster outlines the advances made in the ComPADRE Pathway during the past year. Topics presented will be major updates in the personalization services, content additions, and, most importantly, collaborations with other science education projects.

***Poster Authors: Bruce Mason, Lyle Barbato, Caroline Hall and Matt Riggsbee***

**Expansion and Explosion of the Physics Classroom:** The Physics Classroom, a high school tutorial web site, and ComPADRE have partnered on hosting and expanding the Physics Classroom content. Additional features have been made available and connections with the NSDL have been strengthened. The resultant usage has greatly exceeded all of our expectations. The poster will review the project and its impact.

***Poster Authors: Tom Henderson, Matt Riggsbee and Bruce Mason***

**CSERD - Computational Science Education Reference Desk:** The Computational Science Education Reference Desk (CSERD), a Pathways portal of the National Science Digital Library, is transforming learning through computational thinking. CSERD seeks to demonstrate the power of interactive computing to help students and teachers reach a deeper understanding and application of math and science. CSERD supports both computational (science education), that is, the use of interactive computing tools, numerical models, and/or dynamic visualizations to teach the content and concepts of STEM, as well as (computational science) education, that covers the teaching of the mathematical formulation, the model building, and the numerical solution of such models.

***Poster Authors: Robert M. Panoff, David Joiner, Marty McClelland and Scott Lathrop***

**Engineering Pathway: The Engineering Education Wing of NSDL:** The education of our future engineering workforce has never been more critical than it is today - as engineers are essential to harness the spirit of innovation to create solutions to the worldwide challenges facing people and our planet. Serving as the

engineering education wing of the NSDL, the Engineering Pathway (EP) has designed its website to better engage the next generation by incorporating findings and recommendations from the recent National Academy of Engineering study, *Changing the Conversation*. The tagline messages encourage the use of EP resources to “shape the future” and “turn ideas into reality.” The images, representing numerous library resources, picture diverse people engaged in myriad engineering activities. Engineering Pathway is proud to introduce its redesign in support of a more public-friendly engineering education message. To support learning for broad and diverse communities, with audiences from elementary school through lifelong learners, the K-Gray Engineering Pathway provides a “one stop shopping” portal of comprehensive engineering education resources within the greater NSDL. The EP digital library provides customized pedagogical engineering information and resources for K-12, Higher Education & Professional audiences and activities. Stop by our exhibit booth to learn more, or visit [EngineeringPathway.org](http://EngineeringPathway.org).

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**Expanding the Accessibility of NSDL for Mobile Learning:** There are new opportunities for digital libraries in structured out-of-classroom inquiry-based and project-based learning activities as well as for informal learning activities in homes, museums, and after school clubs. There are also opportunities for learning while students are commuting, jogging, or in other non-educational settings. Educators now have the opportunity to use mobile technologies for embedded use in the classroom and beyond. Documented new pedagogical applications include conversational learning, inquiry based learning, assessment, authentic learning, computer scaffolding and lifelong learning. We present ongoing research on mobile access to digital library resources, and mobile interfaces to contextually relevant digital library resources. This project is working directly with Engineering Pathway, a digital library of high quality teaching and learning resources for applied science and math, engineering, computer science/information technology and engineering technology for K-12, higher education and beyond. Our research includes studies of precision of location metadata, development of mobile applications that enable users to navigate through and access location based digital library resources, as well as creating web-based tools for teachers and students to create, review, and explore collections of location-based learning resources.

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**Social Navigation and Rewards in the Ensemble Computing Pathway:** The Ensemble computing pathway is built on the Drupal content management system (CMS), and we have enhanced it with tools that support social computing. We have designed and implemented social navigation features that passively track and visually represent user involvement with the site, as well as a rewards infrastructure that motivates and credits user activity. The social navigation is available as visual cues (e.g., small squares) near links filled with a shade of green that denote the intensity of users' click traffic: the darker the shade, the more times users have visited that link. The rewards infrastructure consists of badges that are earned by appropriate user behavior, e.g., posting comments to a forum or rating resources. For many badges, we have developed a tiered model, where continued contribution can bump a user into the next category, e.g., from "beginning" to "intermediate" commenter. Together, these tools provide a valuable recommendation system, as well as encourage a dynamic and engaged computing education user community.



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**Community Development and Support in the Ensemble Computing Pathway:** Computing education crosses boundaries among widely varying communities. Many collections exist; many groups are pursuing important tasks that have relevance to a larger community; many types of challenges are addressed in a number of ways. In addition to providing access to resources and tools, the Ensemble project emphasizes the support of communities. In addition to giving work space to these groups, the goal of community support component of Ensemble is to facilitate dissemination of the outcomes of these group activities and the discovery of groups with overlapping and complementary goals. Some of the groups include NSF initiatives, teaching of the first programming course, ACM Education activities, and others. The poster will describe the groups and the services that make Ensemble important to supporting organizations and other communities concerned with computing education.

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**Contextualization, reuse, maintenance, and virtual community for NSDL Web-based materials:** This poster summarizes NSDL-centered activities at Texas A&M University. Texas A&M is one of the partner institutions developing Ensemble, the Pathway for all areas of computing. In Ensemble, we provide Walden's Paths, supporting the creation of learning resources through organization and contextualization of Web-based materials, VKB-server, a tool that allows the organization of resources through spatial representation, and the Ensemble Pavilion in Second Life, which will provide an extensible platform that extends interaction with Ensemble resources into the virtual world. We also are developing two NSDL services. One, to be described in detail in a separate poster, is the Community Navigation Service, which will support community-based recommendations while preserving individual privacy. The second, the Distributed Collection Management Service, will support the maintenance of collections of resources taken from the web by helping to identify when it is necessary to respond to the unpredictable and uncontrollable changes that result from naturally occurring administratively decentralized updates to these materials.

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**HOWTOSMILE.org - A Pathway for Informal Learning Educators:** Howtosmile.org, (SMILE) funded by the National Science Foundation, brings together a consortium of informal education institutions across the country to empower educators working with school-aged children in science, mathematics, engineering, and technology (STEM). National Partners and Collaborators include science museums, federal agencies, professional membership organizations, community-based groups, public television stations, and other organizations engaged in out-of-school education. Activities in howtosmile.org can be sorted by age range, subject matter, materials costs, and preparation time, to name just a few of the search options. The Web site provides both an enhanced faceted and visual search for the collection of hands on activities; list-making features that provides educators a public or private online space to collect their favorite activities and add teaching tips and ideas on how to use an activity in context; user contributed videos, and other creative community functions which encourage users to rate and comment on activities and earn badges for community involvement. Some activities are available in Spanish. Special activity collections target those with limited mobility and individuals who are vision impaired. All howtosmile.org activities are freely accessible, and never require a registration or subscription. Built using open source tools, howtosmile.org also includes an open infrastructure to allow institutions to contribute links to useful activities and a free widget to embed howtosmile.org search results on any webpage. Howtosmile.org is a joint project of UC Berkeley's Lawrence Hall of Science, the Exploratorium,

the New York Hall of Science, Science Museum of Minnesota, Children's Museum of Houston, and the Association for Science-Technology Centers. Howtosmile.org is supported by an array of National Partners and Collaborators dedicated to STEM education. They include: AAUW, Astronomical Society of the Pacific; AZA (Association of Zoos and Aquariums); the Bridge: Online Ocean Science Education Resource Center; COSI (Center for Science and Industry); National Geographic; National 4-H Council; NASA (National Aeronautics and Space Administration); OMSI, (Oregon Museum of Science and Industry); Perkins School for the Blind; TERC; Twin Cities Public Television (Dragon Fly TV) and WGBH-Boston.

***Poster Authors: Darrell Porcello and Sherry Hsi***

**MatDL Pathway: Collaborative Community-Based Efforts for Research & Education:** With a target audience of materials undergraduate and graduate students, educators, and researchers, MatDL Pathway (<http://matdl.org>) assumes stewardship of significant content and services to support the integration of materials research and education. MatDL is a consortium involving NIST, Kent State University, MIT, University of Michigan, Purdue University, and Iowa State University MatDL. Highlights of MatDL's efforts over the past year include: 1) hosting roundtables at meetings of major, international, materials professional societies such as the Minerals, Metals & Materials Society (TMS) and the Materials Research Society (MRS). As a result of this outreach, new educational collaborators, such as RPI, as well as research projects, such as LAMMPS administered by Sandia National Labs, have been attracted to MatDL's MatForge workspace for collaborative development of materials modeling and simulation tools. 2) contributing to expansion of virtual labs to enhance students' conceptual understanding of economies of exchange phenomena related to dimerization and dissociation. 3) collaborating with Cleveland State University and 12 university partners to expand and disseminate work on materials failure cases. By offering materials educators convenient access to relevant, shared learning resources based on research, MatDL, as part of NSDL, helps to positively impact both teaching and learning within materials and cognate disciplines.

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**New at MathDL:** MathDL is a Pathway Project within NSDL sponsored by the Mathematical Association of America. Continuing activities include the online publication Loci, publishing interactive articles, original applets, and, through Loci: Convergence, a wealth of resources for using history in the teaching of mathematics. Under a new Pathways II grant, MathDL is creating communities centered on particular courses with resources identified by topic within the subject, ratings, reviews, and other commentary. In addition, MathDL is creating a Mathematical Communication component featuring materials from the MIT Wordpress site, Mathematics Communication Space.

***Poster Authors: Lang Moore and Tom Leathrum***

**Teachers' Domain Pathways II Year 2:** The poster will provide updated information about Teachers' Domain, including our multiple custom editions, metrics, new and improved design and functionality, social media applications, partnerships with public television and state departments of education, and expanded STEM content.

***Poster Authors: Ted Sicker, Howard Lurie and Peter Pinch***

**TeachingWithData.org: The Social Science Pathway to NSDL:** TeachingWithData.org (TwD) promotes quantitative literacy by helping instructors to use real data in social science classes. The goal is to infuse

quantitative reasoning throughout the social science curriculum and to bridge the gap between substantive courses and classes in methodology and statistics. Two key components of the developing pathway are the Social Science Data Analysis Network and the Online Learning Center at the Inter-university Consortium for Political and Social Research. Both of these resources provide data extracts, online analysis tools, student exercises, and other materials that help instructors integrate data from the census, opinion polls, and advanced social science surveys into their courses. The TwD project also endeavors to provide comprehensive links to other resources promoting quantitative literacy, such as teaching modules, data sets and sources, applications for statistics and mapping, and research on teaching and learning. Future TwD development aims to provide faculty with tools to easily create teaching modules for their students and share them with others. The primary audience for the project is faculty in disciplines such as sociology, political science, economics, geography, and social psychology. The poster describes these aims, presents illustrative teaching materials, and introduces the partners in the TwD project.

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## ***Project Results***

### ***Serving Noyce Scholars with Open Educational Services: California State University, MERLOT, and NSDL:***

With funding from the National Science Foundation, the California State University has created a web-based MERLOT Institutional Teaching Commons (ITC) for western U.S. Robert Noyce Scholars, connecting them to a variety of digital media-based learning objects, lesson plans and other support services. The Noyce Scholars ITC is linked to the extensive collections of the NSDL through a federated search engine created by MERLOT. Small teacher networks, termed “micro-communities”, are enabled with MERLOT Voices social networking tool. The “Build Locally, Link Globally” capabilities of the MERLOT ITC’s enable Noyce Scholars and their faculty mentors to: (1) Build select collections of online science and mathematics learning content and curriculum particularly successful in high needs middle and high schools; (2) Share experiences with instructional applications of NSF’s NSDL resources designed to solve instructional problems in schools which often have no science or math equipment, supplies, labs or textbooks; (3) Enable Noyce Scholars to share NSDL teaching resources and pedagogy with teacher colleagues; and (4) Provide Scholars with ePortfolio tools (MERLOT Content Builder) to assist them in communicating how they are able to use NSDL resources to meet the challenges of teaching in high need settings and working effectively with under-achieving students.

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***A Two-Dimensional Framework for Evaluating Teachers’ Technology Adoption:*** When describing teachers’ adoption of new technology, existing conceptual models tend to focus on a single dimension, either quantitative, such as the frequency or amount of technology use, or qualitative, such as the way in which a given technology influences teachers’ instructional practices. Such one-dimensional approaches can fail to adequately describe similarities and differences in technology adoption between teachers. In this poster, we describe a conceptual framework for teacher technology adoption that incorporates two dimensions: a quantitative description of technology adoption and a qualitative description of technology adoption. We applied this framework to data from a year-long mixed-methods study of Earth science teachers in the Denver Public Schools district who adopted a new Web-based instructional planning system called the Curriculum Customization Service. We

found that evaluating teacher behavior according to both qualitative and quantitative dimensions provided the most nuanced and detailed picture of how teachers incorporated the Curriculum Customization Service into their teaching, suggesting that this two-dimensional framework offers useful insights for those seeking to evaluate not only 'how much' or 'how frequently' teachers adopt a new technology but also how a new technology relates to teachers' instructional practices.

*Poster Authors: Manuel Gerardo Saldivar, Keith E. Maull, Tamara R. Sumner, Benjamin R. Kirshner*

**Intelligent Recommendation of NSDL Resources to support Middle School Teacher Collaboration:** The goal of the project is to develop intelligent resource management and collaboration tools that greatly increase use of NSDL resources by math and science teachers within MSP2. Our work builds on our prior NSF projects on automatic document classification, forum participant profiling, and connecting help seekers to peer mentors within online forums. We will first classify NSDL resources for middle school math and science with respect to categories of teacher activities and interests (such as student evaluation, preparing course materials, looking for technology tools, organizing events, etc.) as well as curriculum topics. The resources will include information that is accumulated within the social networking site, such as messages posted by the teachers, as well as other existing NSDL resources. Our add-on tool will process the content posted by individual teachers according to their activities and interests, and recommend use of matching NSDL resources. When more than one teachers is interested in the same topic or similar activities, the system will promote collaboration by sending a note to potential mentors or collaborators. User feedback or votes on system recommendations will be used for evaluation and tuning. We will also analyze how and when NSDL resources help teachers through both content analysis and voting.

*Poster Authors: Yu-Han Chang and Jihie Kim*

**Personalized Access to NSDL:** Learn more about Access for All metadata for communicating about the accessibility of items in your collection. Vote for accessibility topics you most need to learn more about.

*Poster Authors: Madeleine Rothberg, WGBH National Center for Accessible Media and PI of Personalized Access to NSDL Project and Peter Pinch, WGBH Interactive and Teachers' Domain Pathway*

**National Dissemination of PARI's Digital Resources:** Pisgah Astronomical Research Institute (PARI) encourages student focused access to the tools of radio and optical astronomy through Smiley and SCOPE. Most classroom technology initiatives will support the necessary connections needed for these activities in the classroom. Digital access to these projects through NSDL is supported by NSF DUE# 0937824. Remote access to a 4.6-meter radio telescope (affectionately known as Smiley) located at the Pisgah Astronomical Research Institute near Brevard, North Carolina: This radio telescope detects 21-cm radio waves emitted by hydrogen at the center of our galaxy and its spiral arms, supernova remnants, regions of star formation and other celestial sources. The decisions for each investigation: source selection, pointing the telescope, and taking the measurements, are determined by the user. Lesson modules such as "Doppler Shift", "Mapping Radio Sources", and "What's Between the Stars?" have been used effectively with middle and high school students, as well as college students, providing them with real-time experience in radio astronomy. The labs and hands-on experience increase students' information and technology skills while promoting student-directed critical thinking and problem solving. Access to Smiley observer data is now available at [www.pari.edu/smiley-data/applet.html](http://www.pari.edu/smiley-data/applet.html). Enter a citizen science endeavor and begin working immediately as a member of SCOPE – Stellar Classification Online Public Exploration <http://scope.pari.edu/>. Like Annie Jump Cannon, participate and become engaged in this classification process. PARI is gathering new and reliable classifications for future

scientific use. Beginning with basic properties of stars and how they lend light to their identification and classification, participants will follow the characteristics of different stellar types throughout their lifetime. The spectroscopic data found in SCOPE is used in “The H-R Diagram: A Laboratory Exercise” classroom activity developed for this program. The historical context of the images from which this digital data has been gleaned can also be shared through PARI’s Astronomical Photographic Data Archive, the basis for Time Domain Astronomy in a readily accessible archival setting.

***Poster Authors: C. Witworth, PARI – Education Director, M. Castelaz, PARI - Science Director, T. Barker, PARI – Director of APDA and J.D. Cline, PARI – President***

**Research Opportunities for Undergraduate Biology and Environmental Science Courses Using Online Data:**

Cornell Lab of Ornithology educators and national faculty advisors are creating curriculum resources designed to provide authentic research experiences focused around birds and their habitats for undergraduates. Intended for use in diverse settings, including introductory biology and environmental science courses, courses with no lab or field component, and online or hybrid courses, these investigations leverage large-scale citizen-science databases such as eBird and multimedia resources from the NSDL-funded Macaulay Library, as well as the scientific workflow software Science Pipes. We are developing resources that help faculty make informed decisions about how much direction to provide student research projects using digital resources. Our poster reports on the goals of this NSF CCLI project, outreach strategies (including a project website built in Drupal), approach to providing faculty and their students with organized access to appropriate databases and visualization tools, future research plans related to (cyber)learning outcomes and assessment, and our current and desired collaborations within NSDL.

***Poster Authors: Colleen M. McLinn and Nancy M. Trautmann***

**Visibility + Credibility = Sustainability: A New Decade for ASM’s Digital Resources:** In 2010, all ASM digital resources, now freely available, migrated to two websites. MicrobeLibrary (<http://www.microbelibrary.org>) contains visual resources and laboratory protocols and is hosted by Joomla with web “2.0” features (e.g., rating, commenting). All science teaching articles and curriculum activities were assimilated into the Journal of Microbiology & Biology Education (<http://jmbe.asm.org>) and hosted by Open Journal Systems. In establishing these websites, ASM learned both open access and open source are essential features for sustainability. An active network of open source-content users and fee-for-service contractors are essential for “within budget” and timely delivery of resources. Increased visibility is achieved through indexing in international repositories of similar content. Peer-review adds credibility and provides authors visibility and recognition of scholarly work. Thus, sustainability is achieved by (i) leveraging open source content, (ii) retaining experts for limited work, (iii) allocating staff time for training, acquisitions, review and production, and (iv) promoting scholarly teaching. Previously published content not migrated at this time are archived at MicrobeLibrary Archive (<http://archive.microbelibrary.org>).

***Poster Authors: Amy Chang, Kelly Gul, and Michelle Slone, American Society for Microbiology***

**For Accessible Information Spaces on NSDL" (MAISON) and "Middleware for Network- and Context-aware Recommendations" (MINC)**

projects aim content personalization, preview, and collaborative recommendation services to transform resource sharing and use through NSDL. MAISON (<http://maison.asu.edu>) aims to improve participation to NSDL by teachers, librarians, and learners who are blind. The adaptation options supported by MAISON's CSIP-A protocol include (a) grade/strand focus, (b) context keywords, which affect benchmark clustering, concept extraction and propagation, and textual summary; (c) clustering options to reduce the Strand map complexity, and (d) link previews, for helping the

user who is blind to decide whether to follow a link. MAISON also supports a browser plug-in for annotating web links in other NSDL resources to help individuals who are blind acquire more information about the content of the destination of a link before she clicks on the link. Building on the success of MAISON, MINC focuses on leveraging user's activity context and peers in discovery: (a) understanding the personal activity context through analysis of access patterns and of user's annotations, (b) context-aware resource discovery, including search, presentation, and exploration within the knowledge structures provided by NSDL, and (c) peer discovery, peer-network management, and peer-driven resource sharing.

*Poster Authors: K. Selcuk Candan, Hasan Davulcu and Hari Sundaram*

## ***Tools and Services***

**Technical Network Services:** This poster presents an overview of the tools and services provided by Technical Network Services (TNS) to help the NSDL and broader education community to organize, manage, and disseminate digital educational content to advance STEM teaching and learning. TNS provides 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 demonstrator applications that help teachers and learners to optimize their experiences with digital content, and provides support, training and consultation on the adoption and use of TNS tools and services.

*Poster Authors: Mike Wright, Tammy Sumner, Carl Lagoze and Karon Kelly*

**NSDL Collections: Metadata, Tools, & Assessment:** Learn about 1) understanding the scope and focus of the NSDL collection 2) tools and methods for accessioning a collection and 3) producing quality metadata to support learning applications. The scope and focus of the NSDL collection emphasizes materials that focus on teaching and learning or research relevant to STEM education. As a result, this focus tends to favor learning resources that are interactive, are inquiry-based, use authentic learning and real-time data, experiences and situations. The NSDL Collection Policy and Resource Quality Guidelines provide guidance on selection of and cataloging resources. Learn about these policies and guidelines, as well as view your individual collections assessment and the distribution of NSDL holdings. NSDL provides tools for collection building. This means creating and sharing 1) resources descriptions about learning resources or 2) annotations (e.g. teaching tips, star ratings) for existing NSDL learning resources. NSDL accepts both of these kinds of item-level metadata via: • NCS (NSDL Collection System): for cataloging directly into NSDL • OAI: for sharing metadata records from cataloging applications • WFI (Webfeed Ingest): for creating a collection using an RSS or atom feed • CWIS (Collection Workflow Integration System): for cataloging and sharing metadata and creating a web portal Any metadata format can be used in the above tools and NSDL can now harvest native resource metadata in any format. However, since only item-level, resource metadata in the NSDL\_DC format is discoverable at the main library site of NSDL.org, native resource metadata providers need to provide a transform/crosswalk to NSDL\_DC for NSDL.org display. Finally, learn strategies on when to use the above tools and how. To support the scope and focus of NSDL and the discovery and re-use of NSDL materials, it is vital to describe resources effectively and appropriately. Learn to improve your resource metadata by using controlled vocabularies, educational standards, improving descriptions, adding keywords, and improving the cataloging experience (producing valid XML, training catalogers).

*Poster Authors: Kathryn Ginger, John Weatherley, Laura Lusk, Anh Nguyen, Letha Goger*

**Staying Connected with NSDL via nsdlnetwork.org:** This poster details services and features of the NSDL Community site: <http://nsdlnetwork.org>, that enable NSDL projects and partners to stay abreast of developments and activities across NSDL. Find out information on NSDL activities, trends reporting, and community engagement opportunities with the NSDL Resource Center, NSDL Technical Network Services, Pathways, and other NSDL projects. By joining the NSDL Community site, users can post news and announcements, disseminate reports and articles, post project updates, contribute to community discussions via forums, participate in interest and working groups, create their own Group pages supporting the needs of their projects. interest areas include Metrics, Evaluation, NSDL STEM Exchange, Common Core collections, Learning Registry, Annual Meeting, and collaborating with NSDL.

***Poster Author: Eileen McIlvain***

**NSDL Science Literacy Maps:** The NSDL Science Literacy Maps are an interactive graphical interface that helps K-12 educators and learners understand the relationships between science concepts and to find associated educational resources. The interactive maps are generated through a Web 2.0 API that lets developers embed the maps in their own Web sites and display educational resources and other information in the maps. The maps illustrate learning goals for different grades, and the relationships between goals, for K-12 students across a range of science, technology, engineering, and mathematics (STEM) disciplines.

***Poster Authors: John Weatherley, DLS, UCAR [jweather@ucar.edu]; Tammy Sumner, DLS, University of Colorado at Boulder [tsumner@colorado.edu] and Sharon Clark, DLS, UCAR [sclark@ucar.edu]***

**Supporting Collaborative Activities and Navigation with Spatial Hypertext:** Building on prior work in spatial hypertext and user interest modeling, we are developing tools and services supporting collaboration. This project extends prior work on Visual Knowledge Builder (VKB) to better support collaborative educational activities. VKB is a spatial hypertext system that allows teachers and students to pull together external resources with content of their own in a hierarchic 2D workspace. Educational uses of VKB include pre-authored spaces presenting content, concept maps, as well as template-based or unstructured student authoring tasks. We have developed VKB-Server, a Web service that supports group access to VKB workspaces. Additionally, we are currently developing a Community Navigation Service, initially based on VKB's Interest Profile Manager, to support community-based recommendations while preserving individual privacy by avoiding the use of individual user models at the service level.

***Poster Authors: Frank Shipman, Haowei Hsieh, DoHyoung Kim and Prasanth Ganta***

**Content Clips Update:** Content Clips is a free online service for teachers that lets them organize and present multimedia resources from distributed digital libraries (<http://www.contentclips.com>). The system framework supports varied media formats, and the dynamic gestural interface works especially well with electronic whiteboards. The Content Clips “recipe” lets users find resources in the public Clips Collection, add clips from other sites, mix resources into presentations, and serve the results to students. This poster will highlight first-year findings and activities of the current project (NSF DUE-0938120), which supports improvements that include updating the site interface and adding cross-curriculum content for elementary education. The poster will also show how system elements are being used on the STEM Stories web site at <http://www.stemstories.org> (NSF HRD-073400) and to publish resources for the Beyond Penguins and Polar Bears ezine for elementary teachers (<http://beyondpenguins.nsd.org>, The Ohio State University).

***Poster Authors: Lois McLean and Rick Tessman, McLean Media***

**The Architecture of CWIS 2.0:** CWIS, an open source collection development and resource portal softwarepackage, was developed for NSDL in 2002, and has been in use by the AMSER pathway and other

digital library projects since then. In 2008-2009, CWIS was rebuilt from the ground up, drawing on all of the lessons learned from the hundreds of groups who have used the package, and December 2009, CWIS 2.0 was released. This poster lays out the new CWIS 2.x architecture and plugin-based infrastructure, and details further refinements introduced with the October 2010 release of CWIS 2.1.

*Poster Author: Edward Almasy*

***QIC: Query In Context for Educational Collections:*** Query in Context (QIC) is a NSF funded research project which utilizes techniques in context sensitive retrieval, semantic query analysis, and concept extraction that makes up QIC's portable unified knowledge discovery system. The system will revolutionize individual search by shifting the burden of information overload from the user to the computer. To this end, several methods are explored to incorporate inference of user preferences into query expansion. Augmenting keyword-based search with a user context-enabled component will provide more relevant search results. In addition, by ranking search results aligned with searcher's needs, users should discover in the first few retrieved results what they are looking for, thereby increasing satisfaction by reducing manual effort and time trying to find the appropriate content. Consequently, this research has the potential of increasing the attractiveness of existing digital libraries through increased user satisfaction.

*Poster Author: Min Song*



## ***Evaluation and metrics***

**Best Practices for Metrics Collection and Analysis: Report of the NSDL Metrics Working Group:** The poster details key recommendations from the NSDL Metrics Working Group. Convened in 2009, the Metrics Working Group was tasked with formulating recommendations to the NSDL community on best practices for use of metrics in project planning, implementation, and management. The report details key questions, provides matrices for primary project activities, and includes example vignettes of metrics collection and analysis over a variety of scenarios. The report is a living document, to be augmented by ongoing community comment and contribution.

***Poster Authors: Eileen McIlvain, Kim Lightle, Ed Almasy, Lyle Barbato, Sharon Clark, Yolanda George, Sherry Hsi, Cathy Lowe and Paul MacKinney***

**Some NSDL usage metrics:** In this poster, I will present graphs that show some metrics describing the usage of NSDL in 2010. Possible explanations for monthly (and weekly) variations will also be presented as well as the identified mobile device usage tendency. Poster viewers are welcome and encouraged to discuss those explanations and offer alternative ones. Data was obtained from our Google Analytics accounts with highest numbers of visitors and pageviews, namely the Roll Up account, nsdl.org account, Expert Voices account, and NSDL wiki account, and the Strandmaps account. Variables included are: number of visits, percent of new visits, number of pageviews, average time of site, pageviews per visitor, most commonly visited pages, most common keyword searches on site and results, traffic data, search engine terms and results, and geographic distribution of users within the US.

***Poster Author: Laura Moin***

**Educational Digital Library Evaluation Rubric:** The poster describes an evaluation rubric for educational digital libraries. The rubric has 28 criteria operationalized based on the K-12 teacher perspective. The teacher-centric evaluation criteria originate and are organized by context: pedagogical context (content designations for pedagogy, grade level, state standard and resource type and resource quality); institutional context (highly accurate search results, advanced search capabilities to narrow down results, keyword or subject search); personal context (resource ratings, quality and recommender capabilities, advanced help capabilities, overview of library content) and have been tested in a large-scale evaluation of four educational digital libraries.

***Poster Authors: Anne R. Diekema and Beijie Xu***

**Student Use of the NSDL:** We are exploring how students use collections of digital resources such as the NSDL. In earlier work we examined how faculty used collections of digital resources in their teaching and professional development. We are now examining how students in STEM disciplines at a variety of institutions perceive, find, use and learn from digital resources and what role the "collected-ness" or curation of those resources is important. Our findings will be of interest to many involved in Pathways projects who seek to understand student usage of their collections and expand it. It will also be of interest to those interested in student learning in general.

***Poster Authors: Glenda Morgan, Alan Wolf, Flora McMartin, Joshua Morrill, Patsy Moskal and Charles Dziuban***

**Learning from the Best: How Award Winning Courseware has Impacted Engineering Education:** This study will be a case study of a coherent section of the NSDL, the "Premier Award for Excellence in Engineering Education Courseware," sponsored by the NSDL Engineering Pathway. Over the last 12 years, the Premier Award competition, and its precursor (NEEDS), reviewed 100 courseware submissions and selected 21 award winning courseware creations and eight finalist candidates. Premier Award winning materials have been the most frequently downloaded materials on the NEEDS/Engineering Pathway website. Over 20,000 Premier Award CDs have been distributed and workshops and seminars for engineering educators have been held. The research will address the following questions: 1. How has receipt of the Premier Award impacted the awardees' career paths and why? 2. How has the quality of the courseware submitted changed over time? 3. How has the award winning courseware affected or impacted student learning? The project is studying the population of faculty that is using courseware available through NSDL (via the NEEDS/Engineering Pathway). The findings from this research will lay the groundwork for future in-depth, longitudinal studies of impact on teaching and learning that reach across the sciences, technology, engineering and mathematics.

***Poster Author: Flora McMartin***

**Where Have We Come From and Where Are We Going? Learning the Lessons and Disseminating Exemplary Practices from the Projects of:** We are collecting reflections of the NSDL community members on the collaborative development of the National Science Digital Library (NSDL). The blogsite, <http://nsdlreflections.wordpress.com/>, is a place for NSDL participants to tell the story of how they think NSDL was formed, grew and is continuing to grow. It is also a place for the community to discuss and learn from these reflections as well as respond to a series of 'hot topics' questions regarding the NSDL. The site is open to all members of the NSDL community; your comments will help round out the living history of the NSDL.

***Poster Author: Flora McMartin***

**Educational Data Mining Approaches for Digital Libraries:** Get an update from the EDM research project drawing from data generated by the Instructional Architect and Exploratorium Learning Resources Collection. Learn how to use web metrics and educational data mining to help understand impact. POSTER DESCRIPTION Webmetrics refers to the process of measuring, collecting, analyzing, and reporting web usage data. This presentation shares how two digital library projects, the Instructional Architect and the Exploratorium Learning Resources Collection, have instrumented their websites to collect data, apply web usage data mining strategies and employ educational data mining to better understand their users. This poster will review different data mining methods to examine the IA and ELRC datasets: • Clustering – to put the data into different groups based on their characteristics, for example, grouping users based on their online behavior. • Geographic analysis – to use the geo-referenced data to explore website visit patterns. • Social network analysis – to study the information flow among website users. • Query log analysis – to analyze search terms in the library • Cross validation – combine these analyses with other data (e.g., user surveys). This poster shares the strengths and weaknesses of different online evaluation approaches, as well as gives suggestions on what digital libraries can do to measure impact with educational data mining.

***Poster Authors: Mimi Recker, Sherry Hsi and Beijie Xu***

## ***NSDL Partners***

***The Learning Registry: Share, Find, Use, Augment:*** We know there are lots of good learning resources from the government, institutions and the commercial sector that can be used in many different ways. For example, the US Government has resources from many of the federal departments and agencies. But they are hard to find. It's difficult to tell what resources are available, how they have been used and if they are effective in education. We want to enable learning resource sharing, discovery, augmentation and use, but we don't want to build yet another search engine or portal. Rather, we want to establish a set of core models and a network approach and interfaces (open APIs) for learning resources that anyone can use to expose or consume learning resources and information about how they are used. Rather than build this learning resource network; we want to enable the entire community to build it from a shared approach. The Learning Registry is a project to establish the core network APIs for sharing, exposing, and using all types of learning resources. Project leadership comes from the Office of Educational Technology (DoED) and the Office of the Secretary of Defense (DoD). We work in collaboration with NSDL and other groups, both within the and around the world.

***Poster Authors: Steve Midgley, Office of Educational Technology, Department of Education;  
Paul Jesukiewicz, Office of Secretary of Defense, Department of Defense;  
and Daniel Rehak, Advanced Distributed Learning Initiative***

***Digital Libraries Go to School (DL2SL):*** The Digital Libraries to School Libraries project (DL2SL) is an IMLS Early Career Researcher project that seeks to find seamless ways to integrate digital resources into school library collections. To date, this project has completed a national survey of school librarians' digital resource collection activities and developed a tool, MARC2Web, that creates catalog records for digital resources on-the-fly. This year, the tool will be deployed in schools around the U.S. and the researchers will study school librarians' ability to use their enhanced ability to promote digital resources in classroom implementation.

***Poster Authors: Marcia Mardis and Casey McLaughlin***

***NSF Innovative Technology Experiences for Students and Teachers (ITEST:)*** The Innovative Technology Experiences for Students and Teachers (ITEST) program was established in 2003 by the National Science Foundation to address the looming shortage of technology workers in the United States. The ITEST experience—including 161 projects across 39 states—helps young people and teachers build the skills and knowledge needed to succeed in a technologically rich society. The ITEST National STEM Resource Center will share information about the program and talk with NSDL PIs about ways in which the resources being developed in the NSDL program can be used by ITEST projects and how ITEST projects could supply content to NSDL.

***Poster Authors: Siobhan Bredin, ITEST LRC Co-PI, NSDL NYR Co-PI***

***“Scripto-spatial” mapping of cultural heritage: Optical archeology and forensics of documents:*** The application of digital hyperspectral imaging and associated non-destructive technical analyses to key cultural

objects at the Library of Congress requires the integration of complementary data to address a wide range of preservation and scholarly challenges. Hyperspectral imaging allow researchers to non-invasively characterize pigments and media, retrieve hidden and lost text, and detect production methods of a range of cultural objects. Non-destructive imaging techniques allow the equivalent of optical archaeology of manuscripts and documents, providing a wealth of information and data while minimizing and preventing further deterioration of fragile heritage items through handling and invasive analyses. Integrating the range and volume of data collected from an object in a cohesive data set requires the development of a spatial “map” of the object with temporal and spatial layers of information that relate to specific details on the document. This range of data can include materials characterization of pigments and substrates, the impact of environment and treatments, and topographical layering of data on the document, generating evidence about tools used in the creation of the document. The scripto-spatial organization of data enhances the interpretation of cultural objects and advances the role of science techniques in humanities research.

***Poster Author: Fenella G. France, Preservation Research and Testing Division, Library of Congress***

***Building Education Partnerships: Student Internships in Preservation Science at the Library of Congress:***

The Preservation Research & Testing Division (PRTD) of the Library of Congress is responsible for research, analytical studies, and quality control projects that aid preservation of and access to the Library of Congress’ renowned collection of 145 million historic artifacts (<http://www.loc.gov/preserv/rt/>). PRTD scientists conduct forensic-type identification and characterization of traditional and modern collection and conservation materials, as well as investigate mechanisms by which materials age and react in different environments in order to optimize their preservation. The Library is seeking to create partnerships with educators and learning institutions that allow students to benefit from these exciting real world applications of analytical methods and scientific research. Internships in preservation science at the Library of Congress accommodate students from diverse scientific backgrounds and interests, ranging from high school age to graduate level. Individual projects give students the opportunity to work with scientific reference collections as well as conduct object-based analyses and materials science research utilizing a wide range of instrumentation (<http://www.loc.gov/preserv/rt/PRTDinstruments.pdf>). The scope of any one project is designed to be appropriate to the sojourn and the student’s abilities. Students experience working in a collaborative environment of scientists, conservators and historians/curators. Students present a summary of the project at the end of the internship and, if appropriate, participate in dissemination of the work. Examples of past internships will be highlighted (<http://www.loc.gov/preserv/visiting.html>).

**Poster Authors: Lynn Brostoff, Fenella France, Jennifer Wade, Eric Hansen and Dianne Van der Reyden, Preservation Directorate, The Library of Congress, Washington, DC.**

***Preservation of Sound Recordings: Two dimensional Imaging of Phonograph discs:*** Over the past seven years LC has collaborated with the Lawrence Berkeley National Laboratory on the development of new imaging methods to preserve and create digital access to mechanical recorded sound carriers. These imaging methods are non-invasive and scale naturally to an automated approach, therefore, holding promise as both preservation tools and as a basis for mass digitization. In 2006 a first prototype optical scanner for disc

recordings was built and installed at LC. The IRENE system, as it was dubbed, captures two dimensional images of the disc's surface. Refinements to the original design has resulted in a system that can transfer discs faster than with traditional turntable and stylus methods and with little intervention from an operator. Three-dimensional imaging hardware has improved dramatically since the start of our research. With the full profile of the disc surface being digitized, a wider variety of media can be processed. A prototype three-dimensional imaging system was built and is currently being installed at LC, and this poster summarizes the history, design, and future direction of these systems.

***Poster Authors: Peter Alyea, Eric Hansen and Dianne van der Reyden, Library of Congress  
Carl Haber and Earl Cornell, Lawrence Berkeley National Lab***

## ***STEM Exchange***

**Charting the Userverse: The NSDL STEM Exchange Initiative:** NSDL has long understood the value of being “in the path of the user” as a strategy for enhancing dissemination and educational impact. Yet, our presence in that path has yielded only sparse information about what users actually do with the NSDL resources they discover. The STEM Exchange is a new NSDL initiative that partners with online networks of education practitioners to increase the use of NSDL resources and to capture back information about how resources are being implemented by, and shared among, educators. Through open source web services, online communities of educational practitioners will be able to integrate customizable datastreams about resources from NSDL and other providers directly into their user platforms. The social media activities of practitioner communities will generate data about how resources are being used in different contexts (what the STEM Exchange has termed paradata) that the STEM Exchange will assemble into resource profiles incorporating both hand-crafted and automatically captured information. The resulting paradata about resource use will be fed back into resource profiles to assist users in discovering and utilizing educational materials and to enhance resource providers’ understanding of how their materials are being disseminated, used, and contextualized by practitioners.

***Poster Author: Susan Van Gundy***

**Brokers of Expertise: California's Online Education Resource Initiative:** Brokers of Expertise ([www.myboe.org](http://www.myboe.org)) was launched by the California Department of Education in September 2010 to provide educators with high-quality content and collaboration tools to help close the achievement gap and raise student achievement across the state. Brokers of Expertise supports educators in schools and districts with access to resources matched to academic content standards, online communities to share expertise and best practices, and professional development modules from local and statewide agencies. Following a two-year design and development pilot implementation, Brokers of Expertise will be used by an estimated 40,000 educators by end the 2010/11 school year. The Brokers project includes content from the resource collections of partners including, The Big Read, Calisphere, Edutopia, The Exploratorium, Federal Resources for Educational Excellence (FREE), the Library of Congress, National Archives and Records Administration (NARA), the National Science Digital Library (NSDL), Smithsonian Education, and Thinkfinity.

***Poster Authors: Brian Ausland, Program Administrator, Center for the Advancement of Digital Resources in Education (CADRE) Steve Klein, Professional Development Coordinator, Center for the Advancement of Digital Resources in Education (CADRE)***

**CTE Online:** Curriculum development tools and resources to support academic success and future career opportunities CTE Online helps educators articulate a clear and deliberate relationship between academic achievement and Career and Technical Education through access to curriculum development tools, standards aligned strategies and resources, and a standards database correlated to state assessments for the STAR Tests and the California High School Exit Exam (CAHSEE). CTE Online allows educators to document and share the exceptional, industry specific instruction taking place regularly in our public schools. Career Technical Educators are able to explore and analyze their current classroom industry-based activities and correlate those activities to the most heavily emphasized and assessed academic content standards in Science, Math and English-Language Arts.

***Poster Authors: Brian Ausland, Program Administrator, Center for the Advancement of Digital Resources in Education (CADRE) Steve Klein, Professional Development Coordinator, Center for the Advancement of Digital Resources in Education (CADRE)***

## ***Issues in K-12***

**Vitual Learning Experiences: Created for Youth and by Youth:** This poster will showcase SMARTR, the Middle School Portal 2's student site which features youth-centered content housed in the NSDL and other relevant collections. The poster will showcase SMARTR's Virtual Learning Experience features that present youth-centered NSDL content to middle school youth in a user-friendly format. This poster will also describe the youth-centered educational technology design process developed by Education Development Center, Inc. (EDC) used in creating this student site where youth are asked to collaborate with researchers and designers to identify youth-specific and youth-friendly site design and presentation.

***Poster Authors: Kimberly Lucas, Sarita Pillai and Kit Irwin***

**What do Preservice Teachers Find When using NSDL vs. Google: An Analysis Using the ADMIRE Rubric:** Is there an educational advantage to NSDL? One aspect of educational advantage may lie in the types of educational materials that teachers and learners are able to find and utilize when working with NSDL. We have created a rubric that human coders can use to analyze digital materials in resources for education: the ADMIRE rubric. The ADMIRE rubric categorizes the content of digital educational resources into 14 categories, including multimedia (static visuals, animations, etc.) and curriculum materials (lesson plans, quizzes, etc.). In a study of preservice teachers, the ADMIRE rubric was used to analyze differences in digital resources selected for classroom use when searches were conducted with NSDL Science Literacy Maps, NSDL keyword searches, or Google (interrater reliability = .78). Results showed that preservice teachers were more likely to identify and select digital resources that contained curriculum materials when searching with either NSDL interface compared to Google. Moreover, during exploration of digital resources, preservice teachers were more likely to view pages containing interactive and curriculum materials when using NSDL vs. Google. Overall, results suggest that NSDL may have an advantage in connecting preservice teachers to digital resources that contain the materials that they deem most useful for the classroom.

***Poster Authors: Ashley Crockett, Sarah Davies and Kirsten Butcher***

**Can the NSDL Help Students Learn? Building Standards-based Digital Collections for K-12 Education:** We describe two measures that can be used to predict the likely effectiveness of a digital resource in promoting student learning: 1) content alignment--the degree to which the resource addresses the specific ideas students are intended to learn and 2) instructional quality--the likelihood that the resource will support effective teaching practice and student learning of those ideas. We suggest that at a minimum collections focus on content alignment as a first filter for determining the quality of digital resources.

***Poster Authors: Francis Molina and Ted Willard***

**Executive Director:** Our mission at Schoolyard Films is to educate students in K-12 schools about the natural world and the challenges it faces by providing schools with high quality natural history programming and study guides that reinforce state and national science standards -all free of charge.

***Poster Authors: Tom Fitz***

**CAT Upgrades: 2010:** The Content Assignment Tool (CAT) assists collection providers, catalogers, curriculum developers, and teachers with assigning educational content standards by providing **suggestions of relevant standards. In addition to its web browser-based interactive UI, CAT provides its services to system**

integrators through a REST API. CAT has been enhanced to improve service delivery in the following ways: - expansion of access to available standard document information; - enhancement of fidelity to standard document vocabularies; - decoupling of CAT's internal standard document representation from that used by ASN, as the first step in the process of including standard documents from other producers; - addition of support for remote standards document maintenance; - improvements in standards suggestions quality; and - 90% reduction of standards suggestion query response time. CNLP also now hosts and maintains an instance of CAT at <http://grace.syr.edu:8080/casaa>

***Poster Authors: Steven Rowe and Howard Turtle***

**NSDL Math Common Core Collection**: Since the public release of the Math Common Core State Standards on June 2, 2010, the NSDL has been working in partnership with the Internet Scout Project at the University of Wisconsin, Project 2061 at the American Association for the Advancement of Science, and Math Forum to associate some of its high quality resources to the new Math Common Core Standards. This effort is funded through a grant from the National Science Foundation. The initial collection launch focuses on two critical mathematical themes that build across grade levels: fractions and measurement. These themes tie together multiple domains as described in the Common Core documents including: Measurement and Data, Geometry, Numbers and Operations – Fractions, Operations and Algebraic Thinking, Ratios and Proportional Relationships, The Number System, Expressions and Equations, Statistics and Probability, Functions, and Algebra. The resulting NSDL Math Common Core Pilot Collection is a collection of digital learning objects that include disciplinary information, activities, and lesson plans that often use instructional digital technology, such as applets simulations, and virtual tours. Associating digital resources to standards was challenging because of several reasons, mainly the very nature of the digital world (dynamic, “live,” and with highly permeable frontiers) and the fact that the resources preexisted (i.e. were not developed for) the Common Core Standards. The NSDL undertook the pioneering goal of exploring new processes for associating digital learning objects with educational standards through a three-tier internal review process. In this poster, the three-tier process will be presented as well as the mean meaning of "inter-rater reliability" of resource "alignment" to standards.

***Poster Author: Laura Moin***