



NSDL Projects Updates Collections, Services, Targeted Research, Small Grants

Project Name: **Where Have We Come From and Where Are We Going?**

PI: **Mimi Recker**

Co-PI: **Flora McMartin**

Award Num: **0737821**

Start Date: **10/01/2007**

End Date: **03/01/2009**

Project URL: <http://reflections.cosl.usu.edu/nsdl/>

Description: As the NSDL matures and stabilizes it is becoming increasingly important to know where we have come in order to better plan where we are going. The project seeks to collect the stories and reflections of the NSDL community participants who are building it to:

- Create a growing, open knowledge collection of promising practices and lessons learned consisting of reflections, stories and recollections (formal and informal) about what participants learned, and as set of articles, papers, presentations associated with its development and growth.
- Establish an open mechanism for collecting, creating and sharing knowledge within a collaborative research community.
- Disseminate this collection of lessons learned to the NSDL communities themselves, other digital library and technology enhanced learning communities and other large collaborative projects.

Status: Currently we are collecting and reviewing a set of reflections from about 10 authors. We will recruit new authors at the 2008 NSDL Annual Meeting. We will also be launching the website at the meeting. We are encouraging all members of the NSDL community, past and present, to review the reflections and comment on them. We also invite those who are interested in submitting a reflective piece to contact Flora McMartin, David McCarthy, Susan Jesuroga or Brandon Muramatsu for more information.

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Project Name: **The Biodiversity Analysis Pipeline**
PI: **Steven Kelling**
Co-PI: **Paul Allen, Richard Bonney**
Award Num: **0734857**
Start Date: **01/01/2008**
End Date: **12/31/2010**

Project URL: <http://www.sciencepipes.org>

Description: The Biodiversity Analysis Pipeline (BAP) is an open-source web application that allows students, educators, citizens, and scientists, to create novel analyses of primary biodiversity data and share those analyses within a collaborative community. We expect BAP to transform the ways in which biodiversity data is used by: (1) allowing users to access a diverse selection of biodiversity data resources without needing to understand the details of the data storage or exchange formats; (2) providing web-based tools for data manipulation and exploration; (3) delivering user-generated visualizations and analyses over the web; (4) facilitating creation of a repository of user-authored visualizations and analyses that can be copied, modified, reused, or incorporated as components into other projects or presentations.

Status: Software development is ongoing and alpha release is imminent.



Project Name: **TPC Proof-of-Concept: Digital Libraries go to School**
PI: **Mimi Recker**
Co-PI: **Kaye Howe**
Award Num: **0554440 (TPC and NSDL)**
Start Date: **03/15/2006**
End Date: **03/15/2009**

Project URL: <http://dlconnect.usu.edu>

Description: The primary goal of this project is to help teachers learn to use NSDL resources in ways that meaningfully affect their practice in STEM content areas while increasing their skills as designers of learning activities.

Status: Professional development models have been developed, implemented (online and face-to-face), and extensively tested.



Project Name: **Facilitating K-12 Selection in an Annotated Rich Media Library of Animal Behavior**
PI: **Jack Bradbury**
Award Num: **0532786**
Start Date: **11/01/2005**
End Date: **10/31/2008**

Project URL: <http://birds.cornell.edu/macaulaylibrary>

Description: This Services project is making the online Macaulay Library (the world's largest collection of animal sounds and animal behavior videos) more accessible to many segments of the public and is providing tools to K-12 teachers enabling them to readily incorporate these

animal resources into the curriculum. The principal items resulting from the project activities are: geographic mapping tools overlaying the digital Macaulay Library collection and a collection of voucher specimens that are facilitating teachers in choosing appropriate recordings for inclusion in classroom activities. The natural allure of animals is allowing animal behavior to be used as a springboard for teaching all STEM disciplines. This project is focusing on the development and implementation of four mechanisms for facilitating the selection of annotated recording segments that meet specific K-12 needs: 1) providing online tools that allow teachers to restrict searches to recordings from their immediate or other limited geographic locales; 2) pre-selecting authenticated "typical examples" of illustrative behaviors of favored species; 3) establishing a "double-broker" collaboration system in which curriculum developers (the education brokers) and a Macaulay staff member expert in animal behavior and the content of the collection (the content broker) work together to bridge the gap between what is needed and what is available; and 4) implementing a resource management architecture on top of the existing Macaulay Library infrastructure. For example, the use of these tools is being demonstrated by collaborative development of teaching modules for K-12 that use animal behavior as the focus for teaching physics.

Status: Extensive development and testing of K-12 physics lessons about birds and other animals has been completed, and these lessons are now being finalized and disseminated to New York State teachers through workshops, lending libraries and web sites. Improved tools for both browsing and searching for assets are being rolled out periodically, and the level of annotation and ease of retrieving "species-typical" audio and video examples from the archive is increasing consistently.



Project Name: Professional Development Institutes to Increase Afterschool Educators' Use of the NSDL

PI: Sherry Hsi

Award Num: 0532756

Start Date: 09/01/2005

End Date: 08/31/2009

Project URL: <http://www.exploratorium.edu/afterschool/activities/>

Description: The Exploratorium, in partnership with CalSAC (California School-Aged Consortium), has created and offered different professional development workshops for after-school program leaders and educators using a combination of hands-on materials and online resources from NSDL. The goal of the workshops was to both introduce digital libraries as a source for STEM learning activities (especially for researching activity extensions and "Going Further" ideas) as well as prepare after-school educators in how to do inquiry-based science and encourage creative expression with kids in after school programs. Workshop participants did not need extensive science knowledge or facilitation skills to join. Using the CalSAC trainee network, outreach specialists equipped with training and materials served as disseminators of STEM learning resources from the NSDL. The outcomes of the project include a website of resources for after school audiences, a DVD of activity videos, and a partnership model for professional development and outreach to after-school educators.

Status: The project is in the last stage of disseminating project materials via outreach partners, after-school trainers, conferences, and the website.



Project Name: **Collaborative Project: Superimposed Tools for Active Arrangement and Elaboration of Educational Resources**

PI: **Lois Delcambre**

Co-PIs: **David Maier, Edward Fox, Lillian Cassel**

Award Num: **0435496**

Start Date: 10/01/2004

End Date: 09/30/2007

Project URL:

Description: Education and scholarly research, by their very nature, involve scanning, reviewing, and sometimes intensely studying resources about a subject. But, students, instructors, and researchers rarely treat these "complete" resources in a uniform manner. Resources are not necessarily used in their entirety; sections are not treated with equal emphasis; excerpts/references are often structured and elaborated in new ways.

"Superimposed tools", such as those built by the investigators, allow a user to easily select passages in a variety of base document types (e.g., MS Word, PowerPoint, Excel, HTML, XML, PDF), place them on a scratchpad tool, label them, and arrange them into user-defined groupings and provide annotation. The key functionality in these tools is the ability to select and excerpt an item (which includes a reference) and return to the original source using the original base application to see the selected passage highlighted. This NSDL Targeted Research project is evaluating faculty and student use of superimposed tools in undergraduate and graduate computer science classes, including both traditional, textbook-based classes as well as research-oriented classes. The investigators are also developing digital library services that allow superimposed artifacts to be deposited, indexed, searched, and used along with original library resources. Using and elaborating information at subdocument granularity should support reuse of educational materials by other instructors and students.

Current Status: This project ended on Sept. 30, 2007 but the ideas and tools developed in this project are being further developed and incorporated in the new 2008 Pathways project for computing entitled *Collaborative Project: Ensemble: Enriching Communities and Collections to Support Education in Computing*. The major activities of the original project and their status are listed below. We define "superimposed information" to be any information that includes "marks" where a mark is a reference or address to fine-grained information in a pre-existing document or digital object.

We developed several superimposed applications to help users work with subdocuments, including a notes organization tool, a multimedia authoring tool, and extending the IHMC concept map tool to allow users to create marks and associate them with concepts in a concept map. Experiments conducted in CS courses at Virginia Tech showed that students found this feature in concept maps useful and that they envisioned themselves using it in their classes.

We developed PC and tablet PC versions of an image description and retrieval tool that allows users to associate marks in images with text descriptions (annotations). A user may retrieve information either through text retrieval, where the query is one or more keywords or phrases, or through content-based image retrieval, where the query is an image or a mark in an image and which returns similar looking images or parts of images that have been annotated. In an experiment conducted at Virginia Tech with students in an Ichthyology class, we compared the use of our tool with traditional methods for identifying species. There was a (statistically) significant impact based on the method used for species identification: students identified more species correctly with our tool than with traditional methods.

We authored a strand map to describe the learning objectives in an undergraduate database class at Portland State and then superimposed it over lecture and textbook materials. This allowed students and instructors to: (1) see a directed graph of the learning objectives for the topic (the strand map) and (2) browse to the relevant mini-lecture as well as the relevant textbook excerpts that supported each learning objective. The strand map was used to deliver the lecture to five different classes with three different teachers. The superimposed strand map was also made available to students to facilitate their studying of the material. Survey data indicates that students found it useful.

Based on work at Villanova University and Portland State, we extended the DSpace digital repository software to allow marks (referencing existing documents) to be created, curated using the normal DSpace curation process, and then searched and browsed using the normal DSpace user interfaces. We collaborated with Fabio Corubolo from the University of Liverpool to extend the Fab4 browser (originally developed to create annotation) to create and view marks and their associated excerpts.



Project Name: **Content Clips**
PI: **Lois McLean, McLean Media**
Co-PI: **Rick Tessman, McLean Media**
Award Num: **0435464**
Start Date: **11/01/2004**
End Date: **10/31/2007**

Project URL: <http://www.contentclips.com>

Description: Content Clips is a free NSDL service that helps teachers and developers find, organize, and share web resources (<http://www.contentclips.com> and http://nsdl.org/resources_for/k12_teachers/). It features a search engine and an interface that lets users manipulate and add context to multimedia objects from diverse collections within a dynamic, visual environment. Building on a targeted research study, the site interface was updated in 2008 to incorporate teacher recommendations gathered during a 2007 evaluation. The public resource collection includes both individual clips and aggregated sets and activities, and the system supports a variety of media formats, including images, audio, video, text, and Flash. Registered users also can assemble personal collections by linking to clips from other sites and by creating and saving their own sets and activities. The system framework now supports applications that allow guest access to resources without a log-in requirement.

Status: McLean Media is using the Content Clips system to build STEM Stories, a free online collection that includes the biographies and personal stories of scientists and engineers, plus photos, audio interviews, video clips, and interactive animations (Research on Gender in Science and Engineering, NSF HRD-0734004). Taking advantage of the guest access feature, a collaborative effort with the Beyond Penguins and Polar Bears project is creating and publishing online activities, sets of media clips, and electronic books for a monthly online professional development e-zine for elementary teachers (<http://beyondpenguins.nsdl.org>). As a result, the number of registered Content Clips users has also increased significantly since April 2008.



Project Name: **Computer Assisted Content Standard Assignment and Alignment (CASAA)**

PI: **Anne R. Diekema**

Award Num: **0435339**

Start Date: **09/15/2004**

End Date: **02/29/2008**

Project URL:

Description: This Services project worked towards developing two services for the National Science Digital Library: 1) A computer-assisted standards assignment tool for auto suggesting educational standards for the educational resources in the Library; and 2) A methodology and technology for automatically aligning state standards to selected national standards in order to dramatically improve the ability of teachers to locate resources in the NSDL that will support their standards-based instruction, no matter what state they are in or where a resource was developed. The work resulted in the development and evaluation of two systems. CAT, the Content Assignment Tool, assists collection providers, catalogers, and teachers in assigning content standards by providing suggestions of relevant standards. The Tool makes suggestions which are reviewed by the individual adding the resource to the NSDL. The user then selects and approves the final assignment. In addition, if the individual adding the resource would like to consider other standards, the system allows the user to browse a hierarchical list of available standards and select and add their preferred standards to the list of suggested standards. The system stores these human-vetted assignments and utilizes machine learning techniques in order to improve its own auto-suggestions. This learning can take place at the single cataloger level, or at the organizational level where all assignments from multiple catalogers in an organization are aggregated. SAT, the Standards Alignment Tool automatically finds correlations between a standard and any other standard in the database.

Status: Both CAT and SAT are freely available for NSDL participants to use and integrate into their own tools. CAT has since progressed into a full-fledged tool that has been tried and tested by a team of catalogers for the Thinkfinity.org portal while SAT remains a Beta product that awaits further development and improvement which will require further funding.



Project Name: **The Science Knowledge and Education Network Building a User Base around Scientific Publications: Editing Online Content and Annotating Scientific Materials**

PI: **Steven Kelling**

Co-PIs: **Alan Poole, Paul Allen, Richard Bonney**

Award Num: **0435016**

Start Date: **11/01/2004**

End Date: **10/31/2006**

Project URL: <http://bna.birds.cornell.edu/bna>

Description: The Science Knowledge and Education Network (SKEN) sought to be a platform to transform primary scientific references into continuously update, living publications that include the most current information on their topics.

Status: The SKEN project software continues to be advanced and improved. It is used to power Birds of North America Online, a self-sustaining, authoritative, and comprehensive reference covering the life histories of North American birds.



Project Name: **Collaborative Proposal: DLConnect: Connecting underserved teachers and students with NSDL learning resources and tools**

PI: **Mimi Recker**

Co-PI: **Jim Dorward**

Award Num: **0434892**

Start Date: **09/01/2004**

End Date: **09/01/2009**

Project URL: <http://ia.usu.edu>

Description: Utah State University is collaborating with Eastern Michigan University to create DL Connect: Connecting Underserved Teachers and Students with NSDL Learning Resources and Tools.

Status: Supplemental funding was received to support technical integration of the Instructional Architect with NSDL.org.



Project Name: **Mobilizing Enduring NSDL Resources in Plate Tectonics Research for Earth Science Education**

PI: Stephen P. Miller

Co-PI: **John Helly, Margaret Helly, Anthony Koppers, Hubert Staudigel, Brian E. C. Schottlaender**

Award Num: **0333705**

Start Date: **10/01/2003**

End Date: **09/30/2008**

Project URL: <http://www.Earthref.org/ERESE>, <http://SIOExplorer.ucsd.edu>

Description: The Enduring Resources for Earth Science Education (ERESE) Project bridges the gap between research and education through two NSDL collections: Earthref.org (<http://www.Earthref.org/ERESE>) and SIOExplorer (<http://SIOExplorer.ucsd.edu>). By combining our resources at Scripps Institution of Oceanography and the expertise of practicing educators, the two collections provide (1) hot-off-the-presses Earth science data and images, (2) links to archived and ongoing field expeditions with daily image galleries, reports and video clips, (3) inquiry lessons designed and implemented by our partner teachers, and (4) access to meteorological, geophysical and oceanographic data from over 800 research cruises. Data and images in the collections can be discovered by exploring more than 50 earth science topics through both keyword and geospatial searches. Classrooms may participate virtually in field expeditions to uncharted seamounts in the South Pacific, to investigate the Earth's magnetic field on the ice in Antarctica, and to understand rust-forming microbes by diving in a submersible in Hawaii. Collaboration with SERC's Pedagogy in Action Project, (<http://serc.carleton.edu/sp/index.html>), enhances the presentation and accessibility of ERESE's classroom lessons, with a library of modules allowing users to browse ERESE's collections by pedagogic method as well as by Earth science content.

Status: Content of the two collections is ever-increasing through the addition of new, unique resources, virtual research expeditions and cutting edge marine geophysical data we continue to design inquiry-based earth science lessons for middle school, high school and undergraduate classrooms.



Project Name: **PER-CENTRAL: A Digital Library Supporting Physics Education Research**
PI: **Robert Beichner**
Award Num: **0333555**
Start Date: **01/01/2004**
End Date: **12/31/2008**

Project URL: <http://www.per-central.org> and <http://prst-per.aps.org>

Description: This project includes a site designed specifically to serve as an informational touchpoint and online community for “producers” and “consumers” of physics education research (PER). Here you will find links to articles and dissertations, research groups, PER-based curricular materials, news and events, and many other things of interest to our community. There is also an electronic journal that is now part of the American Physical Society's Physical Review series.

Users of PER-Central are encouraged to actively participate. They may vote in polls, share thoughts, suggest materials for the editor to include in the collection, and build personal collections of materials. Although anyone may use the database, participation requires the creation of a user account so that contributions can be connected to the user. Account creation is free and requires only a name and email address.

The PER-Central website is provided by the American Association of Physics Teachers. It is supported, in part, by the National Science Foundation and the National Science Digital Library Initiative.

Status: Electronic journal and physics education research community website are online and very active.



Project Name: **Collaboration Services for the Math Forum Digital Library**
PI: **Gerry Stahl**
Co-PI: **Stephen Weimar, Wesley Shumar**
Award Num: **0333493**
Start Date: **09/15/2003**
End Date: **09/14/2006**

Project URL: <http://www.cis.drexel.edu/faculty/gerry/vmt>

Description: This NSDL project designed, implemented and studied a collaborative service at the Math Forum digital library. The service allows small teams of K-12 students to work collaboratively online to discuss math problems, topics and issues. The system combines text chat, shared whiteboard and wiki to support the sharing and collection of math resources in the digital library.

Status: The NSDL project leveraged two other grants, which have expanded the project to have an international reach. Over 80 publications have documented this work, including 4 Ph.D dissertations underway and a major edited volume in preparation. The online system for collaborative math is available at the Math Forum for other researchers and teachers.



Project Name: **The FunWorks/Career Resources Network Project**

PI: **Sarita Nair Pillai**

Award Num: **0333426**

Start Date: **09/01/2003**

End Date: **08/31/2007**

Project URL: <http://www.thefunworks.org>

Description: The FunWorks is a dynamic digital library designed by and for youth that supports career exploration in the STEM (Science, Technology, Engineering, and Math) fields. Created in an engaging multimedia format, the FunWorks Web site consolidates information, activities, interactive games, and other resources tied to an array of career choices including Music, Technology, Art/Design, Medicine/Law, Sports, and Exploration. This resource gives young people the opportunity to pursue their interests and make meaningful connections to careers.

Status: Website launch, project activities ended.



Project Name: **A Digital Rich Media Library of Animal Behavior**

PI: **Jack Bradbury**

Co-PI:

Award Num: **0332872**

Start Date: **11/01/2003**

End Date: **10/31/2007**

Project URL: <http://www.animalbehaviorarchive.org>

Description: This Collections project brought the unique resources of the Macaulay Library online as a new part of the NSDL. The Macaulay Library, part of the Cornell Lab of Ornithology, is the world's largest open repository of recordings of animal behavior. Animal behavior is a topic that is intrinsically interesting and can enrich, entertain, enlighten, and educate a broad and multifaceted audience. This project developed: a) interfaces linking the Macaulay Library to the NSDL, b) online annotation tools that allow remote experts to log into our metadata each event and object within a recording, and c) query tools that allow users to search the annotated and authenticated database, move directly to portions of a recording that fit their query, and then edit and assemble suitable segments of recordings for delivery. The annotation and query tool sets included novel visualization and mapping features that greatly enhanced accessibility of the collection to even novice users. This new NSDL collection increased discovery (since searches that move directly to a given location inside a recording are much faster than previewing entire film clips), understanding (since specific and authenticated examples are immediately accessible for many topics), teaching (since educators can quickly produce customized media sets online), conservation (since wildlife management staff can obtain exemplars for training or biodiversity assessment), research (since scientists can rapidly access sample sizes that have hitherto been impossible), the general public (since the media can obtain authenticated examples for stories quickly), and infrastructure (since the technology has broad applications to other collections).

Status: At the term of the grant, roughly half of the total sound and video archive was digitized and accessible online via sophisticated search tools and free streaming players. Several papers were published in professional journals about technical standards and formats,

and our custom sound visualization tool won second place in a major scientific visualization competition. Support for the online application continues with ever improving search capabilities and increasing amounts of clean metadata being released. Our metadata are now being harvested by NSDL, and in response to final surveys and evaluations, we have recently implemented more universal formats for displaying audio and video assets and released a second generation visualization tool.



Project Name: **Effective Access: Using Digital Libraries to Enhance High School Teaching in STEM**

PI: **Katherine Hanson**

Award Num: **0226483**

Start Date: **10/01/2002**

End Date: **02/28/2005**

Project URL: <http://edc.org/gdi/effectiveaccess.htm>

Description: Building on the work of the Gender and Science Digital Library (GSDL), the Effective Access project explored how science, technology, engineering, and mathematics (STEM) educators use (and would like to use) digital resources during lesson preparation, instruction, and professional development. The project also interviewed developers of digital resources to understand how they view the unique needs of high school STEM educators. This research is being shared with collections within the National STEM Digital Library (NSDL), with an end goal of making the collections as accessible as possible to educators trying to integrate digital resources into their classrooms.

Through surveys, focus groups, and interviews, Effective Access staff developed clear pictures of educators' use of digital resources. The project results highlight ways that developers can aid teachers in finding and integrating digital resources. Ultimately, the Effective Access project produced new, useable knowledge to guide the future development of the NSDL and its collections. The findings of this research have applicability to other disciplines beyond STEM and offer the possibility of influencing the future development of all digital libraries.

Status: Products published. Project activities ended.



Project Name: **Metatest: Evaluating the Quality and Utility of Metadata**

PI: **Elizabeth D. Liddy**

Award Num: **0226312**

Start Date: **09/02/2002**

End Date: **08/31/2004**

Project URL:

Description: The primary focus of MetaTest was to evaluate the quality of automatically generated metadata and the usage of metadata. The evaluations were based on assessing the two primary uses of metadata: Browsing and Searching. Users utilize metadata to browse in order to quickly determine if they wish to view the complete resource. Essentially the metadata is viewed as a document summary. Metadata can also be used to classify or group resources thus enabling the user to browse with ease. The second key use of metadata is to enable searching by utilizing the metadata for resource indexing.

The Metadata Quality Study was run to evaluate how well the metadata represented the resource. With the exception of Title and Keyword elements, no statistical difference between the quality of the automatically generated metadata and manually generated metadata was found. However, automatically generated metadata was consistently more completely populated than the manually generated metadata. Results show that compared to manually assigned metadata, automatically assigned metadata performs comparable in retrieval and in quality for most elements, while automatically assigned metadata is much better in the coverage of metadata elements. Also, compared to full-text, automatically assigned metadata performs comparably in retrieval and is better in that it enables fielded searching, limiting searches by particular aspects (e.g., grade, language), and easy browsing of result.

Status: Completed



Project Name: **Bridging the Gap between Libraries and Data Archives**

PI: **Brian E. C. Schottlaender**

Co-PIs: **Stephen P. Miller, Hubert Staudigel, Catherine Johnson, John Helly**

Award Num: **0121684**

Start Date: **10/01/2001**

End Date: **09/30/2004**

Project URL: <http://SIOExplorer.ucsd.edu>
<http://gdccoll.ucsd.edu:8080/digarch>

Description: 100,000 data objects from 753 oceanographic cruises since the 1950's were made available online in the SIOExplorer Digital Library. As the project matured it grew to include five federated collections: Cruises, Photo Archives, EarthRef Seamounts, Marine Geological Samples, and the Educators Collection. Public access to SIOExplorer is considerable, with 795,351 files (206 GB) downloaded over the last year, covering a wide range of disciplines. During metadata harvest, the use of controlled vocabularies greatly tightens up the terminology, inhibiting the traditional sprawl of descriptions.

Status: Completed



Project Name: **Computing and Information Technology Interactive Digital Education Library (CITIDEL)**

PI: **Edward A. Fox**

Co-PIs: **John A. Lee, Manual A. Perez, Lillian Cassel, C. Lee Giles, John Impagliazzo, Deborah Knox**

Award Num: **0121679**

Start Date: **09/15/2001**

End Date: **05/31/2005**

Project URL: <http://www.citidel.org/>

CITIDEL was supported in the first round of NSDL collection projects through NSF NSDL DUE-0121679 grant to Virginia Tech: *Computing and Information Technology Interactive Digital Educational Library (CITIDEL)*, 9/15/2001 - 5/31/2005, led by Edward A. Fox (PI), John A.

Lee, and Manuel A. Perez—with collaborative projects at the College of New Jersey, Hofstra, and Villanova. Tailored software, and a comprehensive collection of computing-related content was built, and related community activities resulted. ACM launched a new publication, the Journal of Educational Resources in Computing. Villanova agreed to provide a permanent home for the educational resources and to support access using DSpace.

Ongoing work later led to further efforts to tailor use of the collection, such as that connected with the NSF NSDL DUE-0532825 grant to Virginia Tech: *Personalization of Content: Bridging the gap between NSDL and its users through the course website*, 9/1/2005 - 8/31/2009, led by Manuel A. Perez (PI), Edward A. Fox, Lillian N. Cassel (Villanova), and Weiguo Fan.

Most recently, CITIDEL will move forward as part of the work associated with the new NSF NSDL Pathways DUE grants 0840713 (Villanova, Overall PI Lillian N. Cassel), 0840721 (Drexel, PI Gregory W. Hislop), 0840597 (Pittsburg, PI Peter L. Brusilovsky), 0840668 (Portland State, PI Lois M. Delcambre), 0840715 (Texas A&M, PI Richard K. Furuta), and 0840719 (Virginia Tech, PI Edward A. Fox): *Collaborative Project: Ensemble: Enriching Communities and Collections to Support Education in Computing*, 9/15/2008 - 8/31/2011.



Project Name: **Gender and Science Digital Library**
PI: **Katherine Hanson**
Award Num: **0121677**
Start Date: **09/01/2001**
End Date: **08/31/2003**

Project URL: <http://www.gsdl.org>

Description: The Gender & Science Digital Library (GSDL) provides high-quality digital resources to 1) help educators promote interest and engagement with STEM (science, technology, engineering and mathematics) education by learners of all ages, particularly females, 2) encourage learners to pursue science education and future careers in science, 3) provide an inter-disciplinary examination of the role of gender in the creation, teaching and learning of science, and 4) build community among all interested users for the purposes of inquiry, information exchange, best practices development and mentoring

Status: Website is launched and active. Project activities have ended.



Project Name: **Collaborative Project: StandardConnection - Mapping NSDL Educational Objects to Content Standards**
PI: Elizabeth D. Liddy
Award Num: **0121543**
Start Date: **09/15/2001**
End Date: **02/29/2004**

Project URL:

Description: This research project concerned the development and testing of a semi-automatic middleware Natural Language Processing (NLP) tool to automatically assign to educational resources the national educational content standards which the resource supports, for use by teachers in selecting relevant lesson plans and activities. The standard assignment task was

approached essentially as a text categorization task in which the educational resources are automatically assigned one or more of the identification numbers of the appropriate standards. During the project the feasibility of these different techniques was explored and a basic Euclidian distance metric was finally used to determine which standards pertain to a certain lesson plan. After extensive evaluation it was determined that standards assignment should be pursued as a computer-assisted task rather than a fully automatic task. This research project formed the basis of the NSF-funded CASAA project in the standards assignment area.

Status: The Standard Connection research provided the basis of our CASAA project and was continued in that project.



Project Name: **Breaking the Metadata Generation Bottleneck**

PI: **Elizabeth D. Liddy**

Co-PI: **Stuart A. Sutton**

Award Num: **0085837**

Start Date: **09/03/2000**

End Date: **02/03/2002**

Project URL:

Description: In this project, the Center for Natural Language Processing (CNLP) worked collaboratively with solutions-united.com, the Information Institute of Syracuse, and the University of Washington to investigate Natural Language Processing (NLP) and Machine Learning (ML) methods in developing capabilities for automatic metadata generation for resources that would facilitate access to math and science educational resources on the Internet.

The project's goal was to demonstrate the feasibility of automatically generating metadata for the National Science Digital Library (NSDL) through the NLP/ML processing of full-text collections from the Gateway to Education (GEM) and from the Eisenhower National Clearinghouse on Science and Mathematics.

Results show that MetaExtract successfully provided metadata for these AskEric resources. A clear benefit provided by MetaExtract is consistency of metadata records as revealed by the evaluation. The quality of the information for subjective metadata elements is generally better when provided manually, but that MetaExtract does provide good information for those elements.

The user study compared a paired set of manually generated records (GEM) with those generated automatically. On a scale of one to five (five being most satisfactory) GEM records were deemed to be slightly better than the automatically generated records. Despite the pre-test, and a clear statement to the participants that the quality of the lesson plans per se varied and was irrelevant to the study, a major problem found by examining the comments appended to the scores was the inability of some participants to ignore the quality of the lesson plan itself when evaluating the associated metadata record.

Status: CNLP is using this technology in an IMLS-funded grant.

