

ChemEd DL Year 1 Activities: Report to NSDL Pathways PI Meeting

August 2007

This report is divided into four sections. Each describes a major aspect of the efforts of the ChemEd DL during its first year of operation. We have accomplished a great deal, but much more remains to be done.

Technical Developments

We have hired **three new staff members** to help carry out the mission of Chemical Education Digital Library and NSDL and expanded the duties of one existing staff member. Lynn Diener is in charge of outreach and workshops. Dolores Sirek is a Web designer and is working on metadata. Rachel Bain's duties have expanded to include the Chemistry Comes Alive! video collection and metadata for general chemistry Textbook Tables of Contents (TToC). Robert Anglin is a Web programmer who will adapt an open-source content management system to the needs of the ChemEd DL.

The **ChemEd DL is creating a new portal** that will encompass the *JCE* DLib collections, the American Chemical Society (ACS) collections, the ChemCollective project, chemistry materials from other NSDL collections, and materials from non-NSDL collections. We have analyzed the requirements for hardware and software to support a large-scale, chemistry-specific digital library, making certain the hardware and software integrate with the NSDL technology base. We developed a list of open-source and lower-cost products that might fit the requirements, tested a short list of suitable applications, and decided on Alfresco (www.alfresco.com) as the foundation for the Chemical Education Digital Library. We have installed and configured new server hardware and begun initial configuration and use of Alfresco to manage both metadata and content for ChemEd DL.

Textbook Tables of Contents (TToC) is our browsing system in which metadata link chapter and section headings from the tables of contents of standard textbooks with online resources in the ChemEd DL. We have refactored TED, our chemical thesaurus and chemical vocabulary editor, to remove dead code and to provide a solid foundation for our TToC browsing system.

We continue to use CWIS as **our metadata repository**. We have explored the ability to ingest large bodies of works into our existing metadata catalog, because we have about 50,000 journal articles, about 2500 videos, and more than 10,000 color images in the collection. We have found it difficult to ingest such large bodies of assets for several reasons. We are currently exploring workarounds to these obstacles so that Journal articles and Chemistry Comes Alive! video can be catalogued into our CWIS system. Eventually we will develop Alfresco to take over this task.

We have begun work on consolidating several databases and implementing our **controlled vocabulary** throughout. These include *JCE* Index, Project Chemlab, Chemistry Comes Alive!, and *JCE* Software Web-Ready. We have determined that a finer grained set of metadata will be required to define all of the topics necessary to implement TToC browsing. At the general chemistry level the ChemCollective project (Yaron) is creating a taxonomy. The Madison group is working on appropriate keywords for general chemistry, organic chemistry, and video materials. Co-PI Theresa Zielinski is working on physical chemistry.

The **American Chemical Society Education Division** (Kirchhoff) is closely coordinating with leaders of the ACS Web Reinvention process. The new ACS Web presence will be launched in September, 2007, and the ChemEd DL will be closely integrated into this process. This up-front planning is essential in identifying in-house resources for the project and avoiding duplication of effort..

Collections

Chemistry Comes Alive! is our award-winning collection of video and still images (**Pirelli International Award** for best Web-based material in chemistry, 2006, http://www.pirelliaward.com/ed11_chm.html).

We have installed and configured a video streaming server and prepared CCA! video for streaming. This collection consists of more than 6000 multimedia Web pages, more than 2000 chemistry videos, and more than 10,000 color images. Keywords have been assigned to all videos and images. Based on a systematic analysis a data base has been created to house all CCA! metadata, and prototype tools and Web sites have been used to test the metadata. Sample videos are available at the *JCE* Web site:

<http://www.jce.divched.org/JCESoft/CCA/pirelli/> .

We have added one **new collection**: *JCE* DataDriven Exercises, edited by W. Tandy Grubbs of Stetson University (<http://www.jce.divched.org/JCEDLib/DataDriven/index.html>). This collection provides data sets that are carefully selected from the literature to support instruction and student exercises that make effective use of the data sets.

We are maintaining and expanding **current collections** of *JCE* Digital Library and preparing for their inclusion in ChemEd DL: *JCE* ChemInfo; *JCE* DigiDemos; *JCE* Featured Molecules; *JCE* LivTexts; *JCE* LrnCom; *JCE* Qbank; *JCE* SymMath; and *JCE* WebWare (<http://www.jce.divched.org/JCEDLib/index.html>).

We are preparing **other collections** and data for inclusion into ChemEd DL: *JCE* Software Web-Ready (http://store.jce.divched.org/shop/index.php?cPath=1_3); Chemical Education Resource Shelf, a listing of textbooks and media; Netorials, a series of online tutorials on general chemistry topics; Periodic Table Live! (which will be made available free of charge once all of its videos are in streaming format); and Today's Science for Tomorrow's scientists, a series of Web sites that relate the work of active research groups in terms understandable to middle school and high school students. Several members of the Madison group are linking articles from the *JCE* and other digital assets to build larger learning objects in general chemistry and organic chemistry.

Outreach and Workshops

Workshops and exhibits have been held for these groups:

- Wisconsin AfterSchool Association Conference, March 3, 2007
- NSDL Web Seminar Series, March 8, 2007
- Two-Year College Chemistry Conference, March 23-24, 2007
- American Chemical Society National Meeting, March 24-28, 2007
- National Science Teachers Association National Meeting, March 29-April 1, 2007
- University of Wisconsin System Workshop, UW-Wash. Co., April 21, 2007
- Best Practice in Science, Math, and Engineering Teaching Conference, May 30, 2007
- ChemEd 2007 Conference, July 31, 2007

Communities and Collaborations

Our plans to develop three new communities each year are proceeding nicely.

We have created a **High School Community**. Terri Taylor of the ACS is organizing high school chemistry clubs and creating a community of teachers who will supervise the clubs for many years. She has set up 51 active clubs and nearly 60 additional high school chemistry teachers are interested in joining. Terri has publicized her efforts at these meetings: Great Lakes Regional ACS, 2006; Northeastern ACS Section High School Day; NSTA Regional meetings in Baltimore, Salt Lake City, Omaha; ACS National Meeting, Chicago, 2007; NSTA National Convention, St. Louis, 2007; Florida ACS Section Annual Meeting and Exposition; and 18 ACS summer workshops.

We have created a **Physical Chemistry Community** and recruited an advisory board. Part of the activity of the community will be to extend/update the online textbook, Quantum States of Atoms and Molecules (QSAM) (http://jce.divched.org/JCEDLib/LivTexts/pChem/JCE2005p1880_2LTX/index.html). One such extension is a physical chemistry QBank collection with more than 800 questions to support QSAM. Additional QBank question sets will be developed to support other components of the living physical chemistry text.

A **Testing and Assessment Community** is being built around the ACS Division of Chemical Education (DivCHED) Examinations Institute. We have participated in two proposals from the Exams Institute to support research involving the *JCE* DLib QBank collection as a means of studying cognitive load theory and to provide criterion-referenced testing. Exams Institute director Tom Holme is building a community of those interested in testing and assessment around the many participants in exam-writing committees.

We have begun work on a **General Chemistry Community** and are developing an advisory board for it. One member of the board will be John Hutchinson (Rice U.) whose Web site contains an entire general chemistry online textbook. We are also digitizing the entire text of a general chemistry book written some years ago by PI John Moore, who now holds copyright to the book, as another basis for creating learning units in first-year chemistry.

The general chemistry community also includes a major component of **translation of existing English-language materials to Spanish**. Rosa Flores, Ingrid Montes, and Shiela Ward (U. Puerto Rico, Rio Piedras) are translating general chemistry tutorials into Spanish and are also designing electronic modules for general chemistry. We expect all of these to be available in both languages in ChemEd DL.

We are creating a **Dissemination Community** in conjunction with the ACS DivCHED Committee on Computers in Chemical Education. The ChemEd DL plans to archive complete transcripts from online conferences (ConfChem conferences) held by the committee. After review, summaries of conference papers will appear in the *JCE* and the full papers and discussions will be in ChemEd DL. To publicize the ChemEd DL among the more than 600 participants in a typical ConfChem, we are planning a conference for April 2008 that will include presenters from several pathways projects as well as other chemistry collections.

We are creating an **Inorganic Chemistry Community**. At last year's NSDL meeting Margret Gieselbracht (Reed College) approached John Moore about collaborating with several inorganic chemists at liberal arts colleges to set up an online repository for inorganic chemistry teaching materials. We are collaborating with this group and have supported a proposal (Hilary Eppley, De Pauw U., PI) to fund this group.

We are working on a **Chemical Information Community**. A wealth of materials for teaching chemical information is available at the CHEMINFO Web site at Indiana University (Gary Wiggins). The Chemical Information Division of the ACS (Susan Cardinal) is interested in a permanent repository for this information and we are collaborating with them to upgrade and check the material before it becomes part of the ChemEd DL.