

NSDL: Enhancing Science Education through a Partnership of Digital Libraries
Dave Fulker, 18 June 2003

The National Science Digital Library (NSDL) is an initiative of the U.S. National Science Foundation, being carried out by over 100 grant recipients. Among these, the author is responsible for “Core Integration” of the library, which includes integrating the results produced by other grantees. The mission of the NSDL is to enhance science, technology, engineering and mathematics education through a partnership of digital libraries joined by common technical and organizational fabrics. Individually and collectively these partners engage and inform multiple clienteles, using shared resources to serve many communities of users, each with its own level of knowledge and modality of learning. The NSDL also embodies longstanding library traditions of service, longevity, equal access, fair use, and privacy, as well as innovations that foster a spirit of inquiry and the accessibility of science to all.

The development of the NSDL envisions four facets of advancement, as follows:

Facet 1: A library of exemplary collections and services.

The NSDL aims to offer dependable, operational access to exemplary collections and services with practical educational value (i.e., they are widely used and affect teaching practices) in science, mathematics, engineering, medicine, and other science-related fields. Comprehensive breadth and depth are the long-term goals, but early stages of the NSDL will combine shallower coverage of most fields with exemplary coverage in targeted areas, selected to be models.

Facet 2: A center of innovation in science education.

Provision of resources alone, be they collections or services, will not yield educational change on the scales envisioned for the NSDL. Hence the NSDL will be a center where virtual “communities of practice” coalesce around and advance the concepts and tools of technology-enhanced science education. The NSDL will be a place (on the Web) where all users can be contributors, share knowledge, discuss innovation, and form groups or communities. In other words, the NSDL does more than organize and route resources from publishers to patrons.

Facet 3: A locus of technical innovation for educational digital libraries.

To achieve its educational goals, the NSDL will need to deploy innovative technological approaches to digital libraries, drawing from ongoing research and development. The NSDL is envisioned as perhaps the largest testbed in existence for studying the practical dimensions of such innovation.

Facet 4: A leveraging partnership among resource and service providers.

The NSDL is a broad partnership that leverages the efforts of many (distributed) providers of resources and educational services, including the NSDL-funded

projects and others who publish educational and scholarly materials or offer classroom and curriculum support services.

Each facet includes phasing challenges. The long-term goal of the NSDL is to have deep coverage across all of science, mathematics, engineering, and other science-related fields, but this cannot be achieved immediately. A practical strategy is to gradually aggregate a large number of specialized collections, services, and views of the NSDL.

Two challenges in this approach are 1) deciding which specialized capabilities to emphasize first and 2) limiting the amount of human effort required to effectively integrate large numbers of collections, services, and specialized views. An important tradeoff is: great breadth with little depth might address challenge two—because shallow forms of integration are easier than deeper ones—but comprehensive depth (well integrated) offers the greatest potential for meeting the basic educational goals of the NSDL. The planned strategy entails deep integration of exemplars, selected to serve as models for future integration of other specialized capabilities in large numbers, with minimal effort. The exemplars will be selected to demonstrate three dimensions of specialization: discipline, learning context, and data type.

Clearly, the NSDL must leverage its efforts on the strengths of many groups. This is manifest in the Leveraged Partnership strategy (Facet 4) but the principle also will be crucial to achieving the full benefits of “breadth and depth via exemplars.” Toward these benefits, partner organizations will be selected to test the NSDL infrastructure and its community-building components for their leveraging efficacies. To maximize the range of value-added capabilities that partners can offer, a data warehousing strategy is being formulated to support a rich and diverse set of digital-library services within the NSDL

Already a remarkably broad set of players has become engaged in building the NSDL, and their interests exhibit significant variation along the three axes of specialization. A significant body of content is now accessible via nsdl.org, though it is far smaller than the envisioned collection. To achieve the full potential, a collection-development policy has been drafted and soon will be circulated for wider feedback. Undecided matters include mechanisms for exemplar selection and participation models, defining the agreements under which partners and end-user organizations will relate to the whole of the NSDL.