Appendicies
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Appendix 2. Further Information About NSDL

It is important to understand what the National STEM Digital Library (NSDL) is and is not; the name can be confusing. Primarily, NSDL is an organizing and descriptive mechanism and access portal to a range of collections of learning resources, mainly "learning objects" (as opposed to the kinds of materials that are coming out of more recent attempts to capture entire courses in video or audio, or to make available course materials through open courseware initiatives). The presumed users of NSDL are mainly teachers, although certainly students (and parents, especially in the case of home schooling) make substantial use of the system. NSDL does not finance the creation of, nor "own," the learning objects to which it provides access, although the possibility of an archival preservation role for these collections involving NSDL has been raised. NSDL has been agnostic as to whether the learning materials to which it provides access are entirely free, Creative Commons licensed, or offered for a fee. NSDL is not the exclusive access mechanism for the collections it organizes: some can be found through tools such as Google, and others have very strong disciplinary and educational communities that are directly linked to the underlying collection (such as Digital Library for Earth System Education). In some cases, other (non-NSDL) NSF funding programs have contributed to the creation and maintenance of content resources organized by NSDL.

NSDL covers learning objects. It does not cover the published scientific and scholarly literature or the gray literature (such as technical reports and preprints); it does not cover scientific, engineering, and other scholarly data resources; and it does not systematically cover full-scale open courses and courseware. All of these materials need to be available in the cyberinfrastructure to support both research and teaching and learning—and they need to be extensively interconnected in new and complex ways (for example, scholarly articles and underlying data are becoming much more intimately linked.). Responsibility for all of this content and its availability in the cyberinfrastructure is diffuse and in some cases unclear, but the important point here is that this has never been part of the NSDL program. And it needs to be addressed, in support of both research and education. For datasets, NSF has made a start with its data-oriented programs within the cyberinfrastructure initiatives. University research libraries, national libraries (in particular, the National Library of Medicine), scholarly societies, and disciplinary researchers are working in many of these areas.

Appendix 3. NSF Reports Related to Cyberlearning

Atkins, D. E., Droegemeler, K. K., Feldman, S. I., Garcia-Mollna, H., Klein, M. L., Messerschmitt, D. G., et al. (2003). *Revolutionizing Science and Engineering Through Cyberinfrastructure: Report of the National Science Foundation Blue-Ribbon Advisory Panel on Cyberinfrastructure.* Report No. CISE051203. Washington, DC: National Science Foundation.

Clough, G. W., Hastings, D., & Lanzerotti, L. (2007). *Moving Forward to Improve Engineering Education.* Report No. NSB-07-122. Washington, DC: National Science Foundation. http://www.nsf.gov/pubs/2007/nsb07122/index.jsp

Cyberinfrastructure Vision for 21st Century Discovery. (2007). No. NSF-07-28. Washington, DC: National Science Foundation, Cyberinfrastructure Council. http://www.nsf.gov/pubs/2007/nsf0728/index.jsp

Edwards, P. N., Jackson, S. J., Bowker, G. C., & Knobel, C. P. (2007). *Understanding Infrastructure: Dynamics, Tensions, and Design.* Washington DC: National Science Foundation. http://www.si.umich.edu/InfrastructureWorkshop/

K–12 and Informal Nanoscale Science and Engineering Education (NSEE) in the U.S. (2005). No. NSF-06-54. Washington, DC: National Science Foundation. http://www.nsf.gov/pubs/2006/nsf0654/index.jsp

Knowledge and Distributed Intelligence Initiative: Taking Stock of the KDI-Science of Evaluation. http://www.nsf.gov/cise/kdi/eval.html

Long-Lived Digital Data Collections: Enabling Research and Education in the 21st Century. (2005). No. NSB-05-40. Washington, DC: National Science Foundation. http://www.nsf.gov/pubs/2005/nsb0540/

National Action Plan for Addressing the Critical Needs of the U.S. Science, Technology, Engineering, and Mathematics Education System. (2007). Report No. NSB-07-114. Washington, DC: National Science Foundation. http://nsf.gov/nsb/stem/index.jsp

NSF Cyberinfrastructure Workshop. (2006). Retrieved from http://www.oit.ucla.edu/nsfci/materials.htm Report of the NSF Workshop for a Plant Cyberinfrastructure Center. (2005). No. biorpt032206. Washington, DC: National Science Foundation. http://www.nsf.gov/pubs/reports/plant_cyberin_report_20060322.pdf

White, J. A., Jones, A. K., Lubchenco, J., Richardson, R. C., Rossmann, M. G., Wrighton, M. S., et al. (2003). *Science and Engineering Infrastructure for the 21st Century: The Role of the National Science Foundation.* No. NSB-02-190. Washington, DC: National Science Foundation. http://www.nsf.gov/nsb/documents/2003/start.htm

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