THE DIGITAL LIBRARY FOR EARTH SYSTEM EDUCATION (DLESE): DESIGNING FOR K-12 EDUCATORS

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1. INTRODUCTION

The Digital Library for Earth System Education (DLESE) is a community-led, NSF-funded effort to help teachers and students quickly find high-quality digital resources for teaching and learning about the Earth. DLESE offers free access to electronic resources including lesson plans, maps, images, data sets, visualizations, and assessment activities. DLESE also includes services and tools to support teachers and students in evaluating, using, and creating online resources. Now in its fourth year of development, DLESE is used by tens of thousands of students and teachers a month, and provides access to over 5000 educational resources.

2. NEW FEATURES IN DLESE

In August of 2003, DLESE introduced Version 2.0 of the library. One of the most visible benefits of Version 2.0 is a redesigned user interface. This improved interface, shown in Figure 1, makes it easier for users to navigate the website, simplifies keyword searches, and streamlines more advanced searches. In addition to a new interface, Version 2.0 of the library incorporates several important enhanced educational services, including:

- *National Standards:* Many of the resources in DLESE are searchable by the National Science Education Standards and National Geography Standards. DLESE is also investigating strategies to extend this service to state standards.
- *Annotations:* This service allows educators to evaluate resources and submit tips for their effective use. Other teachers can view these tips and reviews when they find the resource in DLESE.
- *Reviewed resources:* While every resource in DLESE is relevant to the Earth system and operational, reviewed resources have undergone an extra level of scrutiny, to ensure that they are scientifically accurate, grade-level appropriate and effective for teaching. As shown in Figure 1, these resources are highlighted in search returns.

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3. USER-CENTERED DESIGN

DLESE's development is based on a distributed, participatory community design process, a philosophy of "users-as-contributors", and the direct engagement of science educators. An example of this process is the development of the ability to search by standards. In keeping with the DLESE philosophy of user-centered design, a series of four focus groups with 33 participants were conducted to guide the implementation of the ability to search by standards. Our goals were to:

- ascertain user expectations of and needs for a search-by-standards functionality;
- identify the most useful association between standards and resources.

The focus groups were held in Colorado in January, March and April of 2003. Participants included in-service K-12 educators, university science and education faculty, K-12 district supervisors and pre-service science education students. The participants discussed the process of assigning standards, how they might search for resources using standards, and what it means to be "associated with" a standard. To help focus these discussions around real cases, DLESE staff selected several on-line learning materials that reflected a variety of resource types, grade levels and standards.

In the focus groups, participants indicated that teachers new to the classroom are the most likely to search by standards. Participants felt experienced teachers were less apt to search using standards, but would still find it helpful to see information about standards in the search results.

Participants overwhelmingly indicated that the current DLESE convention of cataloging National Science Education Standards at the "ability" level did not completely meet their needs. In particular, teachers are more often required to document that they are meeting state and local standards, not national standards. Teachers suggested describing resources using at a finer, more specific levels form the NSES (i.e. using "concepts" and "objectives"). They indicated that this more specific level would make it easier to map to state standards, if state standards were not directly offered. For this reason, DLESE has launched pilot programs that aim to develop a way
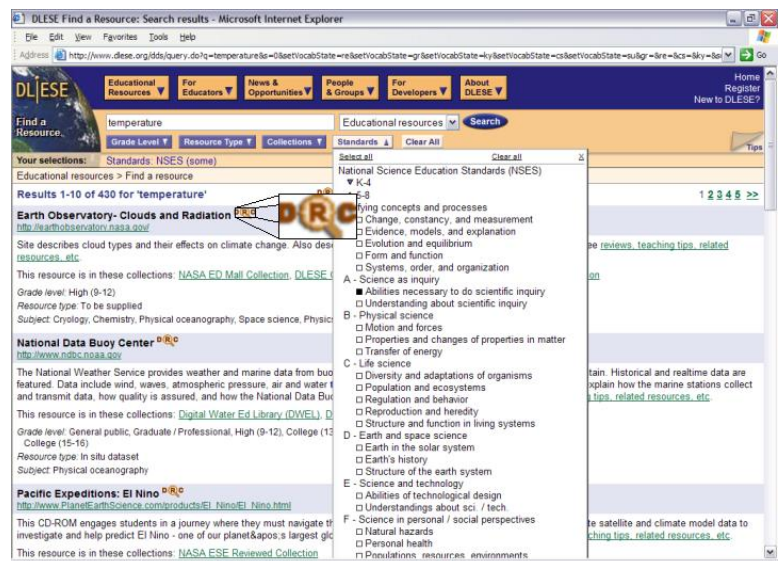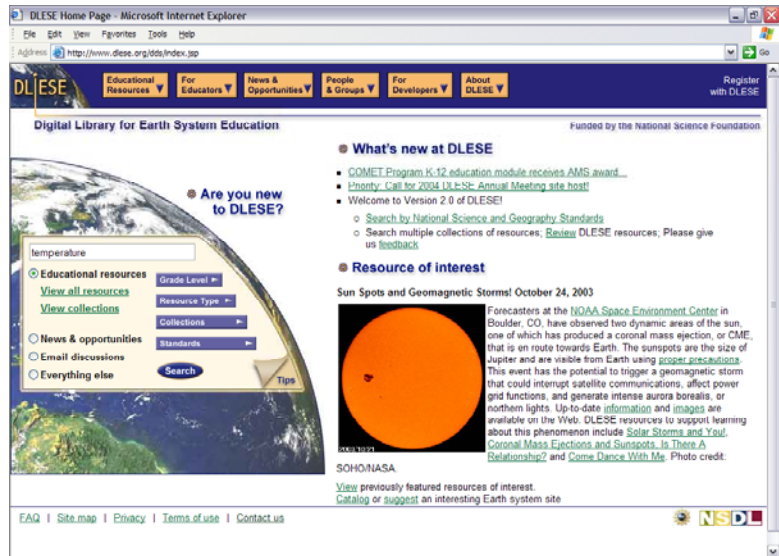
Figure 1: *DLESE's home page (top) and search results page (bottom). The search results page highlights the ability to search by National Science Education and Geography Standards (text-filled box) and the logo for reviewed resources, shown enlarged in the inset.*

to associate DLESE resources with state and local standards.

Finally, the phrase "supports the student learning and attainment of" was adopted to describe what it should mean when a resources is associated with a standard in DLESE. This understanding was used both to guide the cataloging of resources in DLESE, as well as to help shape users' expectations from searching.

4. SUMMARY

DLESE is a free service that allows teachers and students to quickly discover valuable online resources about Earth. New features in the library include the ability to search over national standards, reviewed resources, and annotations. DLESE's development is guided by the principles of user-centered design. As an example, this design process was used to design and implement the new ability to search by national standards.

5. ACKNOWLEDGMENTS

6. WEBSITE

www.dlese.org