**3.5**     DIGITAL LIBRARIES IN THE CLASSROOM: USING THE DIGITAL LIBRARY FOR
EARTH SYSTEM EDUCATION (DLESE) TO SUPPORT LEARNING

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## 1. AN INTRODUCTION TO DLESE

The Digital Library for Earth System Education (DLESE) made its community debut during the summer of 2001. DLESE is an innovative, NSF-funded digital library project designed to support inquiry-based learning in Earth system education at all levels, from K-12 to graduate to informal education.

DLESE enables educators and learners of all ages to locate and use effective on-line resources through a single, trusted portal. It provides a "virtual community center" offering collaborative networking, news, and opportunities for both teachers and students. DLESE is being designed to support resource discovery across a diverse, federated network of holdings and collections, including the Alexandria Digital Library Earth Prototype (ADL/ADEPT), NASA education collections, multiple peer-reviewed collections, and community-created resources that have been contributed, cataloged, and indexed as part of the overall collections.

DLESE is unique in digital library development because of its distributed, participatory community design process, its "users-as-contributors" approach, and its engagement of geoscience educators from inception. Participation in working and interest groups, committees on collections, services, technology, and users, and a Steering Committee that guides policy development and strategic planning are critical components of its robust governance structure (Manduca and Mogk 2000, Marlino et. al. 2001).

## 2. THE VISION OF DLESE IN USE

As part of the participatory community design process, the DLESE community contributed use cases such as the following:

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*Kim, an introductory earth science teacher, needs pedagogical help and instructional material for teaching global climate change and deep time. She would like to locate tutorials, real-time data sets, archival resources, exercises, potential project ideas, and pedagogical assistance. She also wants to know what resources support the National Science Education Standards.*

To find the most appropriate and useful Earth system web resources Kim needs more information than typical search engines or portal sites can provide. She wants to know if resources meet the science standards and how she can use them in her classroom. Since most search engines return only one or two sentences from a resource's body of text, Kim's inquiries about science standards are likely to remain unanswered. DLESE provides greater levels of educational description, giving potential users a level of comprehension about a resource before they actually go to it. This level of description significantly increases her chances of finding appropriate materials, particularly if the resource is heavily imagery and data-related, without much text from which a search engine could glean information. Using DLESE is far more likely to satisfy the broad range of her inquiries, from science standard relevancy to effectiveness and applicability to her setting.

## 3.0 CURRENT STATUS OF DLESE

DLESE currently provides search and browse capabilities via keywords, grade-level, resource type, and content area for over 1200+ resources. When a user elects to view a complete description of a resource they have access to the following information:

- Title, Description, URL of the resource
- Science and geography standards
- Technical information
- Creator information
- Audience or grade-level
- Resource type, content area
- Copyright information

Besides providing access to resources, DLESE provides services to the geoscience community. Library users can submit news and opportunities for posting or subscribe to email groups/discussion forums on various topics. Additionally, DLESE hosts an extensive website on diversity. Ultimately, Kim will be able to access pedagogical help and assessment tools through a teaching and learning center component of DLESE.

## 4.0 DLESE IN USE BY THE COMMUNITY

While DLESE has not yet reached its full potential, it nevertheless is receiving thousands of hits per month, indicating that the Earth system science community is starting to use DLESE in a variety of ways:

A Colorado School of Mines professor of geophysics used DLESE to find resources for his digital signal processing class. He noted that while the resource he found was atmospheric science-related in content, the graph and dataset he obtained showed a classical signal processing type of problem he was trying to demonstrate, which he would not have found through the use of a typical text-based search engine.

A University of Minnesota visualization expert is using a DLESE discussion forum to design GeoWall curriculum and visualizations. GeoWall is a classroom technique for projecting 3-D geoscience imagery in true color.

A science teacher characterized DLESE as "[a] wonderful site. We will use it. You just saved us some time." This teacher and other K-12 educators felt DLESE had three winning points: it is a trusted source, has flexible discovery, and provides well-crafted metadata description for effective resource discovery.

An undergraduate student in the geology department at the College of William and Mary initiated his own evaluation, soliciting student thinking about DLESE and its potential for the future. The students said "[DLESE] makes it easy for students and the 'average bear' [to] understand Earth systems." Students also liked the activities and opportunities section where jobs were posted but felt the student portion needs further expansion.

## 5.0 CONTRIBUTING TO DLESE

Not only is DLESE being used in the classroom, but community members are using DLESE to contribute tools and resources to Earth system education.

The members of the DLESE Dataset Working Group are working on The Earth Exploration Toolbook (EET), which provides examples of how to use geoscience products and tools in the classroom. The examples may be lesson plans or instructions. The products and tools themselves may be datasets, imagery, digital elevation map derivative products, and visualization tools. The EET also contains a template that educators and resource developers can use to create new products. As a special collection, users can browse the EET alphabetically, by topic, by resource type, or by grade-level.

Contributors can also catalog their resources directly within DLESE through the cataloging tool. Resource creators are especially encouraged to do this because they are the most knowledgeable about their resources. Collections of resources can also be contributed through exchanges or creation of catalog records. DLESE also encourages users to suggest URLs of resources they would like to see as part of the library.

## 6. CONCLUSION

A guiding principle of DLESE is its participatory design and its user-as-contributor approach. With these foundations, DLESE can become the first-choice, one-stop resource for Earth system education.

## 7. ACKNOWLEGMENTS

## 8. REFERENCES

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