The SMETE Digital Library at www.smete.org

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Outline

• What are “Educational” Digital Libraries?
• The SMETE Open Federation and SMETE.ORG?
• Projects
• Challenges
“Educational” Digital Libraries

• What do you think I mean?
  – Who’s the user?
  – What services or features are available?
Campus Libraries and Research Digital Libraries

• Traditional “brick and mortar” campus libraries
  – Catalogs of resources
  – Repository of books, periodicals, etc.

• Research digital libraries
  – Typically provide convenient access to vast holdings, access to journals and databases
“Working” Description of “Educational” Digital Libraries

...or...how they go beyond traditional brick and mortar library or “research” digital libraries...

• Either a repository or index to teaching and learning resources
• Directly supports teaching and learning activities of students
  – Undergraduate, and K-12
• Provides support for adapting or adopting resources developed by others (through comments of use, lesson plans, etc.)
• Uses technology to support collaboration, personalization, recommendation of resources
• Supports communities of users

And in SMETE’s case...
• Covers a wide range of science, mathematics and engineering subject areas, encouraging connections between disciplines
SMETE Open Federation and SMETE.ORG

• **The SMETE Open Federation is a virtual, e-learning partnership that:**
  – Offers a comprehensive collection of STEM education content and services to learners educators and academic policy-makers
  – Serves as the integrative organization and distribution mechanism for pedagogical material through a tightly coupled federation of digital libraries
  – Promotes educational reform through participatory communities of learners

• **SMETE.ORG at UC Berkeley**
  – Is the organizational home of the SMETE Open Federation
  – Is a technology demonstration site for “educational” digital libraries
  – Is supported through the National STEM Education Digital Library Program at NSF
The SMETE Open Federation…

• Believes we must…
  – Cover a broad range of disciplines across all of science, mathematics, engineering and technology
    • And should emphasize the interdisciplinary and interconnectedness of learning materials
  – Focus on teaching and learning at the undergraduate, and K-12 levels
    • We recognize that faculty and educators need specific support to teaching and promote learning with these resources
  – Elevate social aspects of developing “educational” digital libraries to the same level as technical ones
  – Have tightly federated/integrated collections and services to allow users the best possible experience
    • Supports each partner collection as a gateway to the whole
    • Enables users at existing partner sites to gain benefits of partnership while remaining at the partner site.
Reach of the Open Federation

• Identifiable audience of **9.25 million** users
• About **250,000** directly accessible community members
• Collectively has **42,000** high-quality, web-accessible digital learning resources
  – 28% Math
  – 17% Physical Sciences (physics, chemistry)
  – 19% Life Sciences
  – 4% Engineering
  – 3% Computer Science
  – 29% Non-STEM (History, World languages, etc.)
• K-12/Higher Education
  – Higher education resources 65%
  – K-12 education resources 35%

As of April 2002
## SMETE Open Federation
### Collaborating Organizations and Projects/Collections

<table>
<thead>
<tr>
<th>Organization/Center</th>
<th>Website/Link</th>
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<tr>
<td>Access Excellence</td>
<td><a href="http://www.accessexcellence.org">www.accessexcellence.org</a></td>
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<td>American Association for the Advancement of Science</td>
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<td>American Association of Physics Teachers</td>
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<td>Coalition for Networked Information</td>
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<td>CITIDEL</td>
<td><a href="http://www.citidel.org">www.citidel.org</a></td>
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<td>Computer Science Teaching Center</td>
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<td>Digital Chemistry</td>
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<td>Education Development Center</td>
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<td>Eisenhower National Clearinghouse</td>
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<td>Exploratorium</td>
<td><a href="http://www.exploratorium.edu">www.exploratorium.edu</a></td>
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<td>Gender and Science Digital Library</td>
<td><a href="http://www.gsdl.org">www.gsdl.org</a></td>
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<td>iLumina</td>
<td><a href="http://www.ilumina-project.org">www.ilumina-project.org</a></td>
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<td>Instructional Architect</td>
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<td>Interactive University</td>
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<td><a href="http://scout.cs.wisc.edu">scout.cs.wisc.edu</a></td>
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<td><a href="http://thelearningmatrix.enc.org">thelearningmatrix.enc.org</a></td>
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<td>LearningOnline Network with CAPA</td>
<td><a href="http://www.lon-capa.org">www.lon-capa.org</a></td>
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<td>Mathematics Association of America</td>
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<td>Michigan Teacher Network</td>
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<td>National Center for Supercomputer Applications</td>
<td><a href="http://www.ncsa.org">www.ncsa.org</a></td>
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<td>NEEDS—A Digital Library for Engineering Education</td>
<td><a href="http://www.needs.org">www.needs.org</a></td>
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<td>Project Kaleidoscope</td>
<td><a href="http://www.pkal.org">www.pkal.org</a></td>
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<td>SRI International, Center for Innovative Learning Technologies</td>
<td><a href="http://www.cilt.org">www.cilt.org</a></td>
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<td>University of California Teaching and Learning with Technology Center</td>
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<td>University of Maryland, Baltimore County</td>
<td><a href="http://www.umbc.edu">www.umbc.edu</a></td>
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<tr>
<td>Utah State University</td>
<td><a href="http://www.usu.edu">www.usu.edu</a></td>
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Development Philosophy

• The difference is *learning*, not just bibliographic information retrieval
  – Teaching and learning require something more
• Guided by *user needs* and philosophy of education that is constructivist
• Link content to community and services
• Build integrative tools and incorporate “best of breed” tools from partners

• Many partners each have a decade or more of experience promoting STEM Education reform
  – Collections: ENC, NEEDS, Math Forum, BioQUEST
  – AAAS, Project Kaleidoscope, NACME, Mathematical Association of America, SRI International
Projects

• On-Going
  – Federated Search*
  – Recommender Systems
  – Metathesaurus Research
  – NEEDS (Engineering) Collection Development*
  – Premier Award*

• New
  – Exploratorium Online
  – Digital Chemistry

* Covered in this Presentation
What is Federated Search?

- Search across multiple collections, whose item-level metadata has been “federated” into a “union catalog”

- Strategies
  - Metadata harvesting: Build a centrally-located union catalog by “harvesting” item-level metadata from multiple remote collections
    - Example: Open Archive Initiative Protocol for Metadata Harvesting
  - Distributed Search: Build a “virtual union catalog” by querying multiple remote repositories based on user initiated action
    - Example: Z39.50, WSDL and SOAP
Advantages and Disadvantages

• Metadata harvesting
  – Advantages
    • Strong guarantee of “quality of service” to end-users
  – Disadvantages
    • Requires central repository to physically catalog and store item-level metadata
    • Timeliness of item-level metadata at central repository dependent on reliability and frequency of harvesting

• Distributed search
  – Advantages
    • Remote collection retains tighter control over re-distribution of item-level metadata
    • Real-time changes to item-level metadata reflected immediately
  – Disadvantages
    • Potentially lower quality of service (time-outs, Internet outages)
Find Partner Collection Learning Resources

Find learning resources in our external Partner Collections using our federated search technology. Search by entering one or more keywords and selecting one or more collections.

Keyword(s): frog

Partner Collections: NEEDS MERLOT

Search Reset

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Results of search for frog

This page shows 1 through 10 of 17 results for your search sorted by Title

More results by page: 1 2

CLOCKWORK PANDA.
By Maeda Mameo
Other Contributors: [none]
Keywords: [Unknown]
Search Score: 82
Possible Uses: Simulation

Costa Rica: Land of Pure Life, 2002
By Mount Arenal Observatory Lodge
Other Contributors: U. S. Army Corps of Engineers
Publishers: Public Broadcasting System, Digital Library for Earth System Education
Keywords: Biology, Ecology, Environmental science
Search Score: 27
Possible Uses: [Unknown]
NEEDS—A Digital Library for Engineering Education

www.needs.org

- “Core” Collection in SMETE.ORG maintained at UC Berkeley
- Established circa 1992 from NSF Synthesis Coalition (engineering education reform)
- Collection of digital learning resources for engineering education (search, browse, catalog)
- Served as technology platform for SMETE.ORG
- Recently re-launched to incorporate advances from SMETE.ORG
Premier Award for Excellence in Engineering Education Courseware

www.needs.org/premier/

• An annual, national competition to identify and reward the authors of high-quality, non-commercial courseware designed to enhance engineering education
  – The Premier Award is about the entire experience of using the courseware by learners, not just the courseware itself

• A dissemination system to distribute the Premier Courseware
  – 14 Courseware packages have been recognized as Premier Courseware since 1997
  – Over 10,000 CD-ROMs of Premier Courseware distributed
Challenges

- Appropriately identifying “Quality” digital learning resources
  - Definition is elusive and varies
  - Mechanisms to identify/demonstrate “Quality” vary
- Integrating external collections of resources like SMETE.ORG into learning management systems
  - Standards help, but policy and social aspects of acceptance still stumbling blocks
- Linking together existing work on collections of resources and services by distributed providers
  - Standards and technology architectures help, but policy and social aspects still key