

# NEEDS, SMETE, MERLOT and the National STEM Education Digital Library Program

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**CONNECTING**  
Science  
Mathematics  
Engineering  
Technology  
Education



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# Outline

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- **NSF's National STEM Education Digital Library Program**
- **SMETE Open Federation and MERLOT**
  - Cooperatives of educational collections, services, user groups and professional societies
- **NEEDS**
  - Engineering education digital library
- **Working Together...**
- **Demos**

## *A Digital Learning Community*

- **The SMETE Open Federation is an e-learning partnership that:**
  - Offers a comprehensive collection of SMET 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

# The SMETE Open Federation...



- **Believes the NSDL should...**
  - Cover science, mathematics, engineering and technology not just “Science”
    - And we should emphasize the interdisciplinary and interconnectedness of learning materials
  - Focus on teaching and learning not only research and “primary source materials”
  - Focus on the social aspects as much, if not more than the technical aspects of building the NSDL
  - Be tightly federated/integrated to allow users the best possible experience

# 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%

## SMETE Open Federation

## Industry

Access Excellence & National  
Assoc. Biology Teachers  
([www.accessexcellence.org](http://www.accessexcellence.org)  
and [www.nabt.org](http://www.nabt.org))

American Association for the  
Advancement of Science  
([www.aaas.org](http://www.aaas.org))

Association of Women in  
Science ([www.awis.org](http://www.awis.org))

BioQUEST Curriculum  
Consortium  
([www.bioquest.org](http://www.bioquest.org))

Biosci Ed Net  
([www.benproject.org](http://www.benproject.org))

Coalition for Networked  
Information ([www.cni.org](http://www.cni.org))

CITIDEL ([www.citidel.org](http://www.citidel.org))

Computer Science Teaching  
Center ([www.cstc.org](http://www.cstc.org))

Digital Library for Earth  
Systems Education  
([www.dlese.org](http://www.dlese.org))

Education Development  
Center ([www.edc.org](http://www.edc.org))

Eisenhower National  
Clearinghouse for  
Mathematics and Science  
Education ([www.enc.org](http://www.enc.org))

iLumina  
([www.ilumina-project.org](http://www.ilumina-project.org))

Instructional Architect  
([ia.usu.edu](http://ia.usu.edu))

Interactive University  
([iu.berkeley.edu](http://iu.berkeley.edu))

Internet Scout  
([scout.cs.wisc.edu](http://scout.cs.wisc.edu))

Learning Matrix  
([thelearningmatrix.enc.org](http://thelearningmatrix.enc.org))

Learning*Online* Network with  
CAPA ([www.lon-capa.org](http://www.lon-capa.org))

Mathematics Association of  
America ([www.maa.org](http://www.maa.org))

MathDL ([www.mathdl.org](http://www.mathdl.org))

Math Forum  
([www.mathforum.com](http://www.mathforum.com))

MERIT Network & Michigan  
Teacher Network  
([www.merit.edu](http://www.merit.edu))

MERLOT  
([www.merlot.org](http://www.merlot.org))

National Action Council for  
Minorities in Engineering  
([www.nacme.org](http://www.nacme.org))

National Center for  
Supercomputer Applications  
([www.ncsa.org](http://www.ncsa.org))

NEEDS—A Digital Library for  
Engineering Education\*  
([www.needs.org](http://www.needs.org))

Project Kaleidoscope  
([www.pkal.org](http://www.pkal.org))

University of California  
Teaching and Learning with  
Technology Center  
([www.uctltc.org](http://www.uctltc.org))

Autodesk\*  
([www.autodesk.com](http://www.autodesk.com))

Cisco Systems  
([www.cisco.com](http://www.cisco.com))

John Wiley & Sons\*  
([www.wiley.com](http://www.wiley.com))

Collegis  
([www.collegis.com](http://www.collegis.com))

MathWorks\*  
([www.mathworks.com](http://www.mathworks.com))

Microsoft Research\*  
([research.microsoft.com](http://research.microsoft.com))

Sun Microsystems  
([www.sun.com](http://www.sun.com))

\*Involved with NEEDS

# Key Features available at [www.smete.org](http://www.smete.org)



- **Users can...**
  - Search and browse for learning resources
  - Access content from “federated” collections
  - Catalog (add) learning resources
    - Based upon emerging international IEEE standards
  - Evaluate the quality of learning resources
    - Using “user” reviews and “expert” reviews
  - Form a community
    - Through partner collections and activities
    - Building upon PKAL workshops and seminars
  - Get personalized recommendations

# “Federated” Collections



- Center for Highly Interactive Computing in Education (local, new wireless collection)
- Computer Science Teaching Center (harvested)
- Eisenhower National Clearinghouse for Mathematics and Science (pass through federated search)
- Mathematical Association of America MathDL (partial harvest)
- Math Forum (partial harvest)
- Michigan Teacher Network (partial harvest)
- National Library of Virtual Manipulatives for Interactive Math (harvested)
- NEEDS—A Digital Library for Engineering Education (local)



[www.merlot.org](http://www.merlot.org)

- **Collaborative to improve access to quantity and quality of teaching and learning resources and to help faculty identify and use those materials**
- **Institutional partnerships with 20+ systems of higher education in the U.S. and Canada**
  - Reaching 8 Million students
  - 350,000 faculty
- **Broad collection extending beyond STEM**
  - Search, browse, catalog, comments, assignments
  - Including: History, Music, World Lang., etc.
- **13 Disciplines doing peer review**
  - Including engineering in collaboration with NEEDS

- **Building relationships with professional societies**
  - American Association of Physics Teachers
  - Journal of Chemical Education
  - Through SMETE Open Federation
    - American Association for the Advancement of Science (and related societies through BEN Project)
    - Mathematical Association of America

# NEEDS—A Digital Library for Engineering Education

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[www.needs.org](http://www.needs.org)

- **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



- National competition to recognize “high-quality, non-commercial courseware designed to enhance engineering education.”
- In its 6th year
  - 11 packages recognized since 1997
  - 10,000 CD-ROM packages of winners distributed



# Working together...

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- **Professional societies and educational digital libraries**
  - Develop new collections of educational resources
  - Link to existing collections of educational resources
  - Link to disciplinary education journals (e.g., Journal Engineering Education, Journal of Chemical Engineering)
  - Collaborate on peer review (professional recognition for reviewers)
  - Make collections available via professional society web sites

# Contact Info



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