



THE NATIONAL SCIENCE DIGITAL LIBRARY

The Internet Scout Project's Applied Math and Science Education Repository (AMSER)

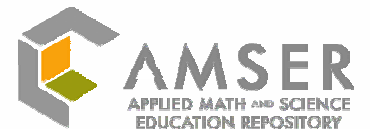


AMSER Focus

Applied Math and Science Resources

Community and Technical Colleges

Internet Resource Discovery &
Applied Resource Discovery Technology

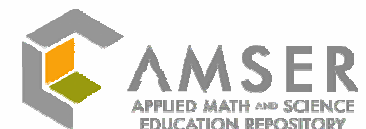


Components of **AMSER**

AMSER Portal -- Metadata Repository with recommender system, search engine, browse, multiple interfaces, & forums

AMSER Updates -- Weekly email updates which users can subscribe to which announce new resources in several topical areas

AMSER Personalized Bulletin Service -- Customized email bulletins which users can configure based on their interests



Components of **AMSER**

My AMSER -- folder system which allow users to group and save metadata records of interest

Faculty Skill Building -- in person and web-based training which helps faculty learn how to best utilize AMSER and other online resources

AMSER Advisory Board



AMSER Partners

Internet Scout Project

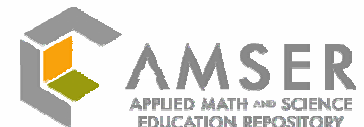
The Multimedia Educational Resource for Learning and Online Teaching (MERLOT)

NSF Advanced Technological Education (ATE) Projects, in particular The Advanced Technology Environmental Education Center (ATEEC)

American Association of Community Colleges (AACCC)

American Mathematical Association of Two-Year Colleges (AMATYC)

The Learning through Evaluation, Adaptation, and Dissemination (LEAD) Center

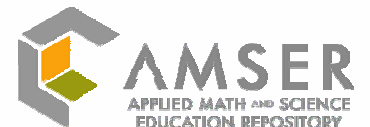


AMSER Contact Info

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Internet Scout Project
<http://scout.wisc.edu>

AMSER
<http://amser.org>





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The Computational Science Education Reference Desk: CSERD

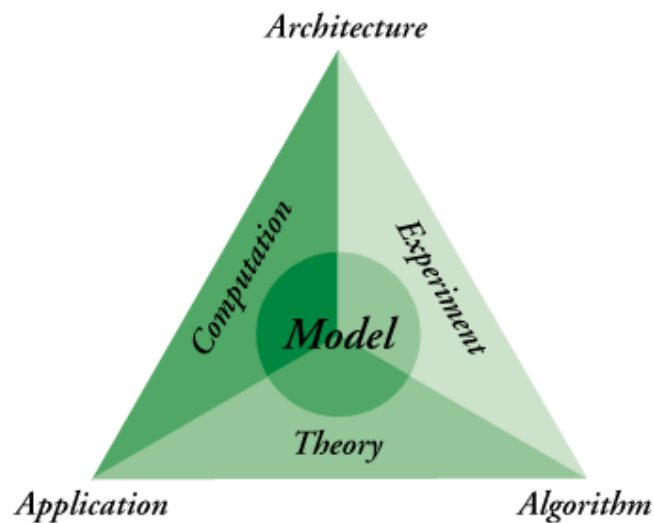


<http://cserd.nsd1.org>



Shodor Philosophy of Education

Mathematics and science are more concerned with pattern recognition and characterization than mere symbol manipulation




Interactive Learning Environments

<http://www.shodor.org>

Computational (Science Education)

Using models and tools to teach concepts

⇒ Curriculum Materials	⇒ Faculty Development	⇒ Student Enrichment
Interactive activities and instructional materials for students, educators, and parents	Workshops, online courses, and educational resources geared towards educators	Internships and workshops that provide students with resources in computational science
		

(Computational Science) Education
Teaching how to build, solve a model

Shodor & NSDL Pre-History

- Participated in early NSDL planning
- Shodor Staff served as project reviewers
- EOT-PACI funded early development, refinement, and assessment, NCSI dissemination
- YOU liked us: numerous NSDL entries
- Shodor staff answering AskNSDL

Community Building: NCSI

- Reaching thousands of faculty and teachers
- Contributing resources and reviews
- Committed to CSERD stewardship in NSDL



Improving a Working Resource

The screenshot shows the CSERD website with a blue header and a yellow sidebar. The main content area is white with a blue navigation bar. The sidebar contains a search box, a list of links, and a bug report button. The main content area has a welcome message, a 'Did you know...' section with an NSDL logo, and a list of three things CSERD does.

CSERD Computational Science Education Reference Desk

Location: Home Login / Register

Home Resources Link Catalog Forum

Search

Home

What is Computational Science?

Why should you care?

Who are we?

How can you help?

Partners

Credits

Submit a bug

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Welcome to the Computational Science Education Reference Desk!

Here at CSERD we are compiling information and materials to help you learn about computational science and incorporate it into your classroom at all levels.

CSERD's approach is to do three things:

- Create a catalog of resources
- Give you a forum to review that material and speak to each other and to ask us questions.
- Create original computational science activities for you to use in your class, or to use as an example in creating your own activities.

Did you know...

..... that CSERD has been accepted as one of the Pathway projects of the

NSDL

SHODOR | NCSI | EOT-PACI | NSF

<http://cserd.nsd1.org>

Learning From What Works

User-in-Loop Design

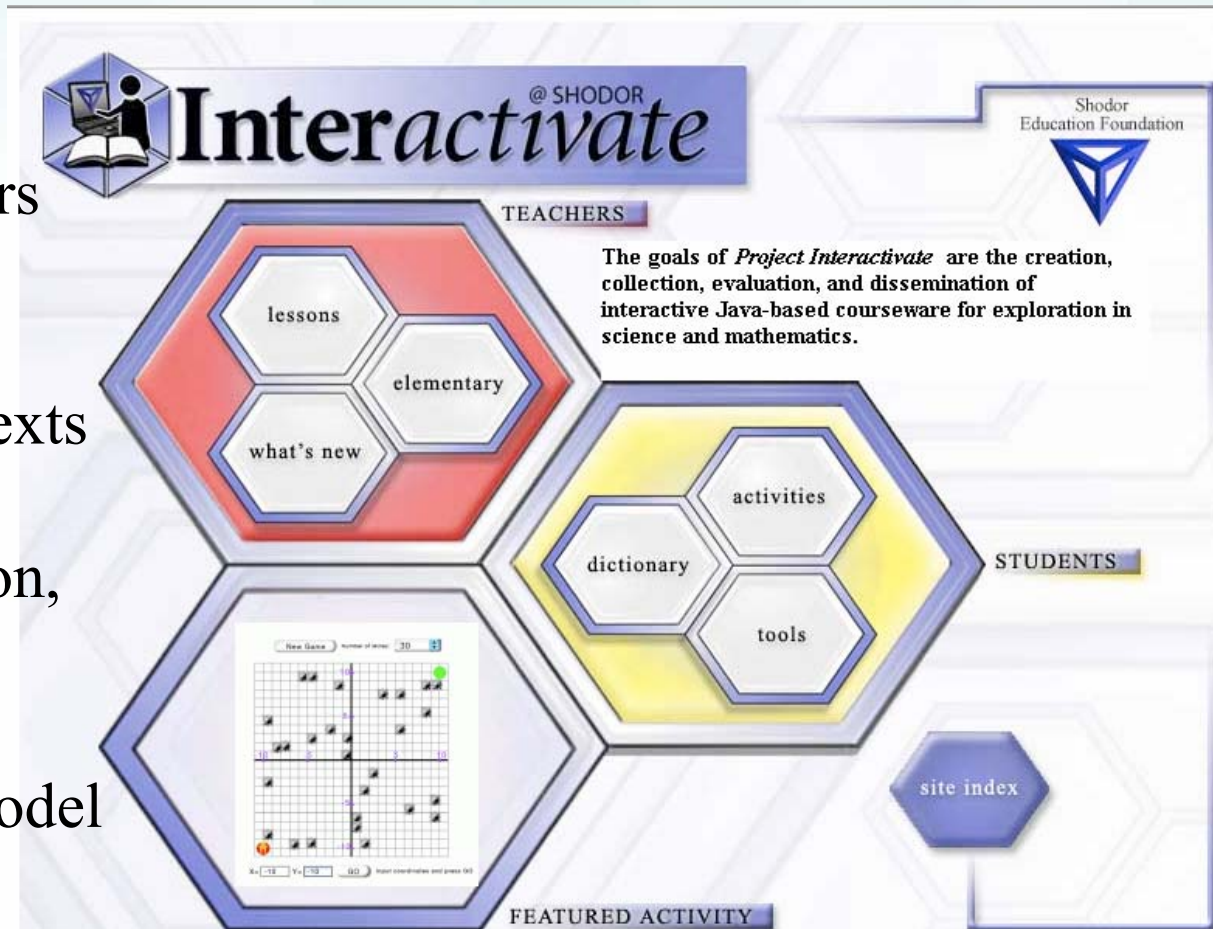
Clear paths for teachers
and students

Links to Standards, Texts

Verification, Validation,
Accreditation

Proven Persistence Model

>1M page views/month



CSERD Project Plan

- Learn to Appreciate PowerPoint (not!)
- Design Documents for Portals, Operability, Content, Outreach (by 4Q2004)
- Verification, Validation, Accreditation of existing CSERD materials (start 1Q2005)
- Renew NCSI, CSE Workshop (2Q2005)
- VVA of computational resources in NSDL (to start 3Q2005)
- VVA of other collections, Research to Learning (to start 1Q2006)

Planned Partnership

- Clemson University
- NCSI Staff and Alumni
- Mentor Center @ Shodor
- LEAD Center (Evaluation)
- North Carolina Central University
- OSC, NCSA, Krell, Capital U., NCSEC
- Sigma Xi, the scientific research society
- National Institute for Community Innovations
- EPIC: Engaging People in Cyberinfrastructure

*Those Who Work
Get to Keep Their Jobs*

CSERD Contact Information



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NSDL Middle School Pathway at ENC



ENC Middle School Pathway Goals

1. help middle school mathematics, science, and technology teachers find high-quality, grade-appropriate NSDL resources for instruction and professional development
2. build on the technology and metadata infrastructure created by Core Integration for the larger NSDL

ENC Pathways Accomplishments

1. Demonstrated the capacity to harvest, augment, and display item-level metadata from the NSDL Metadata Repository (MR)
2. Created three online publications that place NSDL resources in a standards-based context for middle school teachers
3. Developed prototype full-text resource searches by state and national standards

Metadata Harvesting

- Worked with 21 NSDL-funded collections that have appropriate middle school item-level metadata in the NSDL Metadata Repository (MR)
- Filtered records from some collections for those most appropriate for middle school
- Initially harvested metadata for more than 30,000 resources

Metadata Augmenting Process

- Developed database to house and process harvested metadata records
- Reviewed harvested metadata catalog records to identify high-quality, standards-based resources
- Added necessary metadata for grade level, learning resource type, and subjects
- Initially selected 350 NSDL resources for subject-specific browse lists

enc.nsdI.org

- User-centered design based on middle school teacher focus group input
- Subject-specific browse lists feature NSDL resources that are standards-based and appropriate for middle school instruction or teacher professional growth
- Online publications highlight selected NSDL resources addressing hard-to-teach topics: measurement, plate tectonics, and prototype development

Reusability

- Reusability Guidelines informed designs for the MSP site
www.reusablelearning.org
- Creative Commons license in place
creativecommons.org

Benefits to NSDL Collections

Building on work done by the collections, MSP targets NSDL resources to a middle school mathematics, science, and technology audience. We...

- Augment original metadata
- Present NSDL in subject-specific browse lists
- Package resources into online publications
- Include logos of the source collections

ENC Pathways Future Plans

- Regularly **reharvest** the MR to update item-level metadata
- Identify and harvest **additional collections** and services (let us know of your interest!)
- Make available **searches by state and national standards**
- Develop **new online publications**
- Make augmented **metadata available** for harvest by the NSDL MR



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The Math Gateway

A Pathway for Undergraduate Mathematics



Lang Moore

The Mathematical Association of America



NSDL Annual Meeting



November 15, 2004

Background 1: MathDL

www.mathdl.org

- NSDL Collection Grant (2000)
- Original design and hosting by Math Forum
- Now hosted at MAA using a CMS developed by Lucidea



SEARCH

The Mathematical Sciences Digital Library is composed of the following resources:

MathDL is an online resource published by the Mathematical Association of America. The site provides online resources for both teachers and students of mathematics.

[Welcome to the New MathDL!](#)

[About MathDL](#)

[Copyright and Fair Use Information](#)

[Privacy Policy](#)

[Contact Us](#)

[MathDL Featured in Math Forum
Newsletter](#)



This project is supported by
National Science Foundation
Division of Undergraduate
Education



National Science
Digital Library

Convergence



We welcome you to this new online magazine which will provide a wealth of resources to help teach mathematics using its history.

[visit this site](#)

Feature links:

[The Right and Lawful Road](#)
[A Euclidean Approach to the FTC](#)
[Can You Really Derive Conic Formulae from a Cone?](#)
[Euler's Analysis of the Genoese Lottery](#)

Digital Classroom Resources



The Digital Classroom Resources (DCR) provides a select collection of free online learning materials which are available through the site. These materials have been classroom tested and peer reviewed.

[visit this site](#)

Featured Sites:

[A Smart Polynomial Graphing Applet](#)
[Functions Grapher](#)
[Families and Points Plotter](#)

Journal of Online Mathematics and its Applications



Welcome to JOMA, the scholarly journal of MathDL, now in its fourth year of publication.

[visit this site](#)

Featured items:

[Special Relativity and Conic Sections](#)
[The Probability/Statistics Object Library](#)
[Derivative Plotter](#)
[Accumulated Change and Antiderivative Plotter](#)
[Editor's Notes, October 2004](#)

OSSLETS



Osslets (open source, sharable mathlets) are free and flexible interactive components you can easily add to your Web pages. The collection includes ready-to-use curriculum units.

[visit this site](#)

[multiParameterAnimation](#)

Upcoming MathDL Features

- MAA Reviews
- Basic Library List
- Classroom Capsules
- Illustrative Resources (for math program guidelines)

Background 2: Mathematical Sciences Conference Group on Digital Educational Resources

- Annual Meetings at MAA 2001 – 2004

Activities

- Representation of math on the Web
- Reusability
- Core Subject Taxonomy

Subject Taxonomy

Core Subject Taxonomy for Mathematical Sciences Education [Mathematical Sciences Conference Group on Digital Educational Resources](#)

The first two levels of this taxonomy are used for classifying JOMA documents by subject matter. A fuller indication of the meanings of those levels may be obtained by scanning the deeper levels.

1.0 Numbers and Computation

1.1 Number Concepts

1.1.1 Natural

1.1.2 Integers

1.1.3 Rational

1.1.4 Irrational

1.1.5 Algebraic

1.1.6 Real

1.1.7 Complex

1.1.8 Famous Numbers

1.1.8.1 0

1.1.8.2 pi

1.1.8.3 e

1.1.8.4 i

1.1.8.5 Golden Mean

1.2 Arithmetic

1.2.1 Operations

1.2.1.1 Addition

1.2.1.2 Subtraction

Math NSDL Taxonomy Committee Report,
April 2, 2002, with draft changes proposed for
Section 9 by CAUSE, May 16, 2004

The Math Gateway

- Portal to undergraduate mathematics
- My Library capability
- Workspace for groups
- Math in the News

Other Math Gateway Activities

- Workshops: At meetings of the MAA
- Evaluation: Directed by Flora McMartin
- Market Surveys

Math Gateway Partners

- **MathDL**
- **MERLOT**
- **Eisenhower National Clearinghouse**
- **Math Forum**
- **iLumina**
- **College Board**
- **CAUSE**
- **Demos with Positive Impact**
- **National Curve Bank**
- **Virtual Laboratories in Probability and Statistics**
- **Ethnomathematics Digital Library**
- **Duke Connected Curriculum Project**
- **webODE Project**
- **Eduworks**
- **WeBWork**

Schedule

Ongoing

- Extension of Core Subject Taxonomy
- Descriptions of reviewing procedures
- Development of standards for new partners

Summer 2005

- Launch of Portal
- Begin Math in the News

Contact Information

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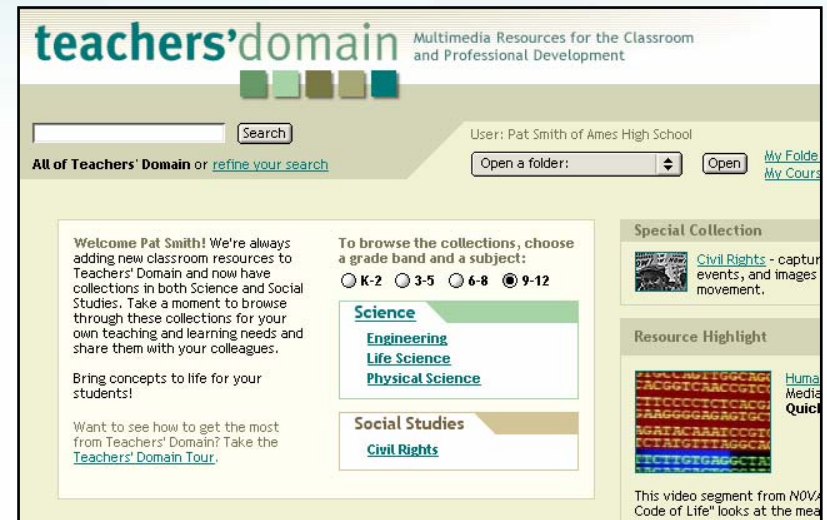


Pathways to Science: Rich-Media Resources for K-12 Teachers



What Is *Teachers' Domain*?

- Life and Physical Science/ Engineering collections of resources from public broadcasting, now expanding to encompass resources from the larger NSDL and Earth/Space Science
- Video, audio, interactive, image, and text formats
- Targeted to K-2, 3-5, 6-8, and 9-12 grade bands




What Is *Teachers' Domain*?

- Contextual information for each resource
- Correlation to state and national standards
- Media-rich lesson plans that model inquiry-based teaching practices

Triangles: Testing the Strength of a Gumdrop Dome

[Printer-Friendly Version](#) [View Standards](#)



Media Type: **QuickTime Video**
Length: 2m 27s
Size: 3.6 MB [View](#)

In this video segment adapted from *ZOOM*, cast members construct simple structures based on the light-but-strong design of the geodesic dome using gumdrops and toothpicks. These gumdrop domes help demonstrate that some shapes, like triangles, are inherently strong while others, like squares, are comparatively weak.


[Save...](#) to My Resources.

Alternate Media Available:
[PDF Document](#)
[Spanish PDF Document](#)

Topics Covered:
[Engineering Design](#) (3-5)
[Motion, Forces, and Energy](#) (3-5)
[Engineering Design](#) (6-8)
[Motion, Forces, and Waves](#) (6-8)
[Systems and Technologies](#) (6-8)

Lesson Plans Using this Resource:
[Shapes That Make Structures Strong](#)

Source:
ZOOM

Produced by:


The gumdrop domes in this video resource are modeled after geodesic domes. Beginning in the 1950s, American architect and engineer Buckminster Fuller popularized this fresh, and in some ways better, take on the centuries-old dome. A geodesic dome is made of many similar but smaller interconnected shapes. The shapes are configured to form a rigid, almost spherical framework in which forces are evenly distributed among the dome's individual members, called struts.

Triangles are particularly stable shapes, so they are great to use in building geodesic domes as well as other structures. They don't twist, bend, or collapse easily, in contrast with rectangles and other shapes. A push on a corner of a square, for example, produces a diamond shape. You can't change the shape of a triangle without altering the length of one of its sides.

A geodesic dome is a particularly good choice if you want to build an enclosed structure with lots of open interior space that is strong, lightweight, and easy to assemble. Every strut braces every other strut, and the structure's curvature distributes weight so that all of the struts share the load. That's right, a geodesic dome's spherical shape and framework construction actually allow it to support its own weight without the need for floor-to-ceiling columns, thick walls, or other obstructions.

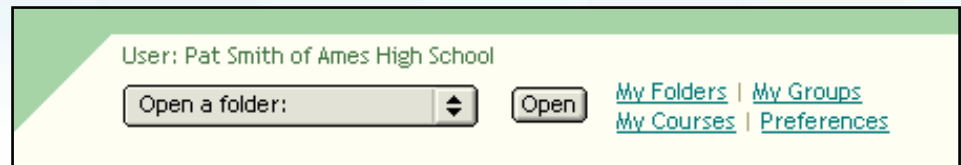
Although the *ZOOM* cast members test the strength of gumdrop domes under an externally applied load -- the weight of books -- geodesic and other domes are not designed to perform this function in the real world. Nevertheless, the activity effectively demonstrates that you can build rigid structures using a strong fundamental shape and relatively little building material.

Questions for Discussion

- Why do you think the gumdrop domes work? Explain in terms of pushes and pulls.
- When a load that is too large is finally put on the gumdrop domes, how do you think they will fail? Will the toothpicks pull out, push through, or do something else? Do you think the toothpicks would ever break?
- What are some other objects or buildings that are constructed from triangles made into a dome?
- What are the advantages and disadvantages of a dome construction for a building such as a house?

What Is *Teachers' Domain*?

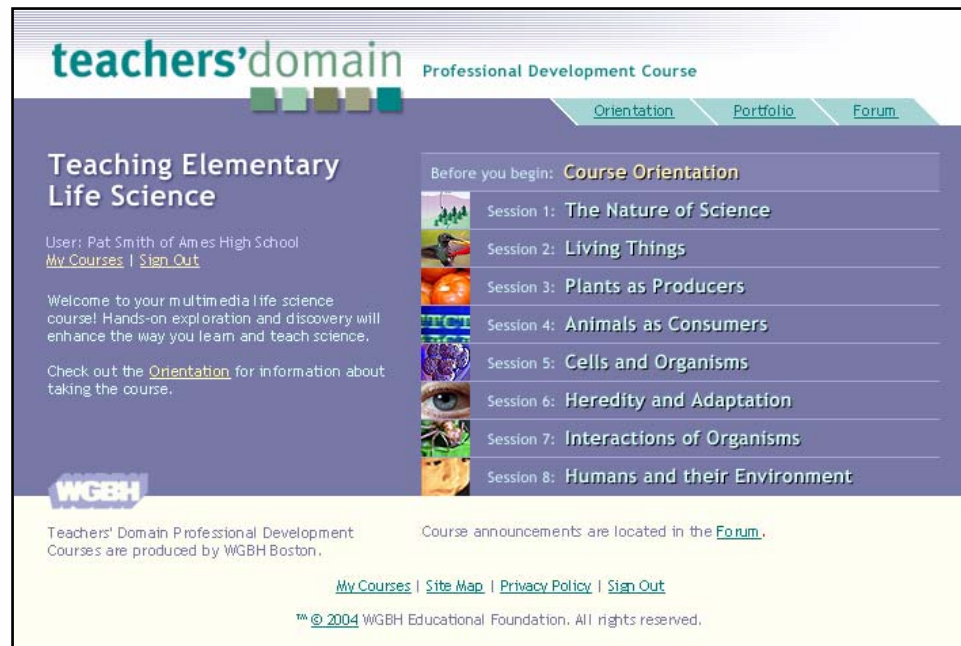
- Resource folder and user group functionality



User: Pat Smith of Ames High School

Open a folder: [My Folders](#) | [My Groups](#)
[My Courses](#) | [Preferences](#)

- Resources serve as key content for companion online professional development courses



teachers'domain Professional Development Course

Orientation Portfolio Forum

Teaching Elementary Life Science

User: Pat Smith of Ames High School
[My Courses](#) | [Sign Out](#)

Welcome to your multimedia life science course! Hands-on exploration and discovery will enhance the way you learn and teach science.

Check out the [Orientation](#) for information about taking the course.

Before you begin: **Course Orientation**

- Session 1: The Nature of Science
- Session 2: Living Things
- Session 3: Plants as Producers
- Session 4: Animals as Consumers
- Session 5: Cells and Organisms
- Session 6: Heredity and Adaptation
- Session 7: Interactions of Organisms
- Session 8: Humans and their Environment

WGBH

Teachers' Domain Professional Development Courses are produced by WGBH Boston. Course announcements are located in the [Forum](#).

[My Courses](#) | [Site Map](#) | [Privacy Policy](#) | [Sign Out](#)

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Teachers' Domain Pathways Activities

- Provide NSDL stewardship, in collaboration with project partners, to aggregate video, interactive, and other rich-media resources drawn from across the NSDL and other collections
- Adapt all assembled resources to conform to the validated *Teachers' Domain* model, with background essays, lesson plans, and correlation to national and state-level standards
- Provide dissemination, outreach, and support through a professional development course, online workshops, classroom videos, and CD-ROM demonstrations, to assure widespread distribution and informed use in schools
- Collaborate with the CI and other Pathways projects on technical standards, infrastructure, and organizational processes

Project Partners and Collaborators

- Digital Library for Earth System Education (Earth Science)
- BSCS (Life Science)
- Harvard-Smithsonian Center for Astrophysics (Physical Science)
- EDC/Center for Children and Technology (Evaluation)
- NSDL CI and other Pathways projects



Year One

(October, 2004 to September, 2005)

- Coordinate with Core Integration and other Pathways projects
- Begin development of the Earth Science collection with DLESE (190 resources)
- Revise and expand state and national standards correlation
- Begin formative evaluation

Year Two

(October, 2005 to September, 2006)

- Coordinate with CI and other Pathways projects
- Complete Earth Science collection with DLESE
- Develop Earth Science Professional Development course with DLESE
- Continue formative evaluation
- Begin marketing and outreach efforts

Year Three

(October, 2006 to September, 2007)

- Coordinate with CI and other Pathways projects
- Expand Life Science and Physical Science collections with BSCS and Harvard-Smithsonian (50 new resources each)
- Produce Demo CDs
- Conduct marketing and outreach activities
- Continue formative evaluation

Year Four

(October, 2007 to September, 2008)

- Coordinate with CI and other Pathways projects
- Make course revisions based on evaluation results
- Develop six workshops across the three areas
- Produce *Teachers' Domain in Action* videos
- Conduct marketing and outreach activities
- Complete formative evaluation
- Conduct summative evaluation



Is located at:

www.teachersdomain.org

(registration is free)