

**Learning Repositories included in Learning Repository Investigation  
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(Additional materials will be made available online with the final report.)

**Apple Learning Interchange (ALI)** -- [http://newali.apple.com/ali\\_sites/ali/nav5.shtml](http://newali.apple.com/ali_sites/ali/nav5.shtml)  
Sponsored by Apple Computer, Inc. the Apple Learning Interchange describes itself as an “online magazine where educators using Apple and other related software and hardware share resources that support quality educational practice.”

The site was launched in 1998, delivering text-based units of practice and maintaining a collection of those practices and other teacher resources. Recently the collection has showcased media-based exhibits.

The ALI Web site provides access to a collection of resources developed by educators and by ALI itself to encourage the use of information technologies in education and to improve educational practice generally.

The ALI collection is made up of “Exhibits,” units intended for educators interested in improving their classroom practice. Some of the Exhibits are of teaching techniques requiring the use of computer technologies, but many can be practiced without using such technologies in the classroom.

An Exhibit packages for the educator such various types of information as the lesson under discussion, educational standards that the lesson meets, examples of student work, level of parental engagement, as well as of administrative support, step by step guides through the use of a given lesson, and the technologies required for successful execution of the lesson. Most of these Exhibits are multimedia presentations that show the lesson in use and records previous student response.

Exhibits are divided into various categories; Teaching Practice, Leadership Practice, Expert Showcase, Virtual Fieldtrip, and Education Event Online. While all exhibits are intended to be viewed initially, if not solely, by the educator, the categories differ with respect to how directly the information delivered relates to educational practice.

The ALI’s collection can be searched through a keyword search, or by subject, educational level, or Exhibit type. Users submitting resources are provided with templates upon which to record the various parts of their Exhibits as well as metadata describing the Exhibit, these templates are described as “useful in managing the development of your teaching practice exhibit.” Subject, educational level, and other fields constrained by controlled vocabularies are created using drop down boxes.

It is difficult to assess the size of ALI’s collection but it definitely has several hundred Exhibits.

The Apple Learning Interchange has encouraged the development of a larger community of educational affiliates who manage their own sites and content. These affiliates include the Arizona Learning Interchange, the Digital Edge Learning Interchange, and The George Lucas Educational Foundation Learning Interchange. Each of these interchanges has adopted ALI's model for creating, classifying, and describing Exhibits.

**BIOME** – <http://biome.ac.uk/> BIOME is a hub within the UK's Resource Discovery Network (RDN) and is funded by the Joint Information Systems Committee (JISC). The collection, to which users can submit materials for review, provides access to “evaluated, quality Internet resources in the health and life sciences, aimed at students, researchers, academics and practitioners.” The collection is managed by a team of subject and information technology specialists in partnership with other organizations.

**Blue Web'N** – <http://www.kn.pacbell.com/wired/bluewebn/> Part of the SBC Knowledge Network, Blue Web'N provides users with access to 1200 educational sites covering all ages and subject matters. Metadata for materials include Dewey Decimal Numbers. Materials are rated by onsite staff and users may suggest sites but do not apply metadata.

**Canada's SchoolNet** – <http://www.schoolnet.ca/home/e/> Mandated by the Canadian government to work in partnership with the provincial and territorial government to connect Canadian schools and libraries, SchoolNet provides users with access to over 5,000 teacher approved learning resources for teachers, students, and parents. The resources are searchable with basic keyword searches and advanced searches. Users suggest resources and approval of resources as well as metadata creation are performed by site staff.

**CAREO (Campus Alberta Repository of Educational Materials): Learning Commons Educational Object Repository** -- <http://careo.ucalgary.ca/cgibin/WebObjects/Repository.woa?theme=default> CAREO has developed a prototype repository of over 3,500 educational materials on various subjects and interactivity levels as part of a larger project to create “a searchable, Web-based collection of multidisciplinary teaching materials for educators” for Alberta and elsewhere.

The prototype repository is part of an ongoing research project that places it under revision occasionally. The repository may at times be offline for updates and upgrades as the project evolves.

Currently the CAREO collection is made up of materials submitted by users who have signed on as members of the project. Submitted resources are reviewed by an editorial review board. Each item may be discussed, allowing users to describe a resource or add comments to that resource's record. CAREO does not have a permanent protocol for metadata creation and importation but it does and will use CanCore to describe its materials.

In this early phase of its development CAREO's experience with its repository has led the project leaders to conclude that

*The main test facing CAREO goes beyond the technology. The repository technology is being refined and Alberta is rapidly upgrading bandwidth to its higher learning institutions and K-12 schools. Populating the repository and the peer review process will be the major challenges, as will getting institutes to adopt MIT's and MERLOT's philosophies of the open source approach to sharing intellectual property. Another challenge will be in the training of educators in the consistent application of the metadata standard as applied to describing learning objects, and in the training of educators and learners in the use of the repository.*

**Connexions** -- <http://cnx.rice.edu> The *Connexions* project at Rice University has created an open repository of educational materials and tools to promote sharing and exploration of knowledge as a dynamic continuum of interrelated concepts. Available free of charge to anyone under open-content and open-source licenses, Connexions offers high-quality, custom-tailored electronic course material, is adaptable to a wide range of learning styles, and encourages students to explore the links among concepts, courses, and disciplines. Connexions fosters worldwide, cross-institution communities of authors, instructors, and students, who collaborate on the creation of knowledge building blocks from which courses are constructed. The ideas and philosophy embodied by Connexions have the potential to change the very nature of teaching and learning, producing a dynamic, interconnected educational environment that is pedagogically sound, both time and cost efficient, and engaging.

Funded by The William and Flora Hewlett Foundation, Rice University, and the Hewlett-Packard Corporation, the Connexions project has a collection of over 1300 modules, each an XML document meeting specific criteria allowing their use and reuse in various contexts. Connexions will be officially released in December of 2003. Each item, all of which have Creative Commons licenses, is written in cnxML, a format that contains both the metadata for a material and the content itself. "Since XML encodes what the content means rather than how it should be presented (displayed), modules are very flexible – the same cnxML knowledge module can be displayed as an individual Web page, woven seamlessly into many different courses, converted to PDF, PostScript, or LaTeX for printing, or even processed through a speech synthesizer to read material to the blind. Content can easily be transferred into a variety of stylesheets and online contexts, preventing the material from being packaged with backgrounds, fonts, and other details that would prevent their seamless integration into a single course of instruction. Connexions metadata draws on the Dublin Core Metadata Element Set.

Materials within the Connexions collection can be created and joined together using authoring tools provided by the project. Using these tools creators can, "crate or modify knowledge modules representing individual concepts, identify links to other knowledge modules or Internet resources, annotate module content, share a working space for working drafts while the content is under development, search the repository for other relevant modules, and perform many other functions prior to committing the knowledge building block to the repository."

**Computer Science Teaching Center (CSTC)** – <http://www.cstc.org> Sponsored by the National Science Foundation and the Association for Computing Machinery Education Board, the CSTC collection consist of roughly over one hundred materials useful in college and graduate level computer science education. Much of the material is not browser based but is downloaded directly and run off the user’s system. Metadata for materials are created by users.

**Computing and Information Technology Interactive Technology Interactive Digital Education Library (CITIDEL)** -- <http://www.citidel.org> CITIDEL serves to “establish, operate, and maintain a part of the NSDL that will serve the computing education community in all its diversity and at all levels.” CITIDEL activities include community development, expanding through workshops knowledge and skills regarding the development and use of online educational content. CITIDEL currently contains 445699 resources from 9 source collections. Most of these resources are articles and technical reports but the collection does contain some materials created for the educational setting.

**The Co-operative Learning Object Exchange (CLOE)** – <http://lt3.uwaterloo.ca/CLOE/> A collaborative project of fifteen Ontario universities created to “develop an innovative infrastructure for joint development of multimedia-rich learning resources.” CLOE is developing a “virtual market economy” of learning objects. This economy of learning materials will encourage users to create materials and submit them to the collection using access to other learning materials as an incentive. The collection, which can be accessed only by member institutions, contains over 60 materials, all of which are interactive browser based materials combining various assets into the learning experience.

Metadata are created by submitting users. CLOE’s metadata schema is drawn from IEEE LOM. Most of the current fields are not required for resource submission.

CLOE is gathering extensive information on the reuse of learning materials and is applying it to community development and encouraging participation in it learning materials economy.

**The Digital Library for Earth Systems Education (DLESE)** – <http://www.dlese.org> DLESE, funded by the NSF, provides users with access to over 3,500 materials of interest to educators and learners to support Earth system science education. The collection includes resources such as lesson plans, maps, images, data sets, visualizations, assessment activities, curricula, online courses, and other materials. DLESE prioritizes community building, which is reflected in its Web page, containing sections on using online resources in education, news from the fields of earth science and science education and information on resources for professionals within the earth sciences.

**EducaNext** – <http://www.educanext.org/ubp> EducaNext, provides access to thousands of resources on various subjects of relevance to teaching and learning at the college level and higher. Member institutions list their materials on the site as well as fees for those materials. The site provides a forum for the creation of a market for learning materials. Member institutions are solely responsible for the creation and accuracy of Metadata,

which is based upon Dublin Core, and IEEE LOM.

**Education Network Australia (EdNA)** – <http://www.edna.edu.au/go/browse/> Supported by education.au, a non-profit company limited by guarantee and owned by the Australian education and training Ministers, EdNA provides users with access to over 16,000 materials of interest to teachers and learners of all levels, covering a wide range of subjects.

Resources are suggested to EdNA by users. If these materials are accepted into the collection Metadata is applied onsite according to the EdNA metadata schema, which draws on the Dublin Core. EdNA draws on thesauri to apply natural language terms to materials and thus encourage discovery of resource discovery.

Metadata that conform to the EdNA metadata standard or Dublin Core can be harvested from other collections. EdNA harvests from select collections within Australia. This harvesting is part of a movement on EdNA's part to develop a distributed repository of learning materials for Australia.

**Educational Software Components of Tomorrow (ESCOT)** – <http://www.escot.org> ESCOT develops software components and has created a network for testing them in an educational context. These materials are available on the ESCOT website, though access to them requires browsing through the site itself. The site currently contains 20 Applets and 16 resources for Applet creation. Materials are classified according to a simple set of mathematical subject areas.

**Eisenhower National Clearinghouse for Mathematics and Science Education (ENC)** -- <http://www.enc.org/resources/collect> Initially developed in 1992 as a collection of K-12 teaching materials within mathematics and the sciences, and information concerning federal funding for education, ENC has come to deliver a wide range of digital content to educators. Online lessons and activities are listed within the ENC online catalog of educational materials.

Located on The Ohio State University campus and funded through a contract with the U.S. Dept. of Education, the ENC has a huge collection of materials either of use in the classroom itself or that can supplement and direct lessons or pedagogical method. ENC describes the collection as “the best selection of math and science education resources on the Internet.” Its collection of online materials numbers in the tens of thousands.

ENC both links to sites containing educational content and holds materials at its own site. Requests for permission to reprint materials on the ENC site itself must be submitted to the site staff.

ENC collection development prioritizes materials that support national goals in mathematics and science education. ENC's Content Support Staff and other ENC staff, both drawing on an institutional base of consortia, outside persons, and contacts among educators, identify candidates for inclusion within the collection of online resources.

ENC has two Abstractors on site, each with MAs in specialties pertaining to the materials they describe, who assign metadata to materials. Web sites are evaluated in order to ensure that their content is of use to the educational community. Resources are also evaluated to distinguish exemplary sites. These exemplary sites are described among the ENC Digital Dozen. Some resources are also listed along with evaluative information from outside sources.

An ENC record contains a long abstract and fields for Subject, Resource Type, Media Type, Grades, Publisher, and Date. ENC is working on a subject classification that will allow for common searchability with GEM and NSDL.

The ENC site, beyond the collection made available there, also provides a large variety of information of interest to educators, including articles on educational topics and documents and links relating to professional development. The variety of information available to educators makes the repository of learning materials at ENC just one part of a host of information services that ENC provides to educators.

**Enhanced and Evaluated Virtual Library (EEVL)** – <http://www.eevl.ac.uk/index.htm>  
Based at Heriot Watt University in Edinburgh and funded by the UK's Joint Information Systems Committee (JISC) as part of the Resource Discovery Network (RDN), EEVL provides users with access to over 10,000 resources useful to teachers and learners within engineering, mathematics, and computing. Originally a virtual library of engineering materials, this service expanded in 2001 to including mathematics and computing. Users may recommend materials, submitting descriptions and keywords. Other metadata, including EEVL's subject classifications, are applied to materials onsite.

**Exploratories** – <http://www.cs.brown.edu/exploratories/home.html> This project, dedicated to producing electronic materials for use within courses has developed 71 Java Applets demonstrating concepts in science and mathematics. The materials are for college and graduate teaching. Materials have no searchable metadata but can be accessed by browsing the project's site.

**Fathom Knowledge Network, Inc.** – <http://www.fathom.com> Fathom provides users access to around 300 free "courses," each requiring about 2 hours to complete. The "courses" cover a variety of topics and are meant for learners in higher and continuing education. Users must sign up for an account with Fathom to use these "courses" but use is free. Materials are submitted by a variety of member institutions including the British Museum, the American Film Institute and RAND, each of which holds the copyright to the materials they submit to the Fathom collection.

**Gateway to Educational Materials (GEM)** -- <http://www.thegateway.org> Established in 1997 and funded by the U.S. Dept. of Education, GEM gives users access to a collection of over 31,000 materials both educational for students and for the aid of educators. Materials within the GEM collection range over all educational levels and subjects.

The contents of the GEM collection are made up of “quality lesson plans, curriculum units and other educational resources on the Internet.” Its resources are useful to educators with various levels of access to technology in the classroom. Some materials are browser based, interactive learning materials, others are lesson plans or class materials that are either for teacher use or must be printed out to be used by students.

The GEM collection is created by a consortium of Collection Holders, these are “organizations who have collections of educational materials that are or will be cataloged and entered into The Gateway. Collection holders apply to GEM to have their materials made included within the GEM collection. Materials within the collection are then reviewed according to criteria such as the authoritativeness of the materials within the collection, their significance with regard to national educational standards, and the accessibility of the materials.

Organizations that have been accepted as GEM Collection Holders manually catalog resources according to GEM metadata standards. GEM Metadata, the schema for which is based on the Dublin Core Metadata Element Set, are created using a downloadable interface called GEMCat. This interface, by presenting the cataloger with a series of forms and drop down boxes, enforces metadata fields and small controlled vocabularies.

Subject classifications are assigned according to a system created by GEM, allowing searching by both broad and narrow subject terms. Its current, experimental search engine also allows searching by educational level. Users may also specify whether they wish to search for terms within the Title or Description fields of records.

GEM metadata records are almost always complete and include useful description fields that explain the contents and uses of a resource. Other fields specify the use a material will for teachers and/or students, and the instructional strategy the resource has been developed for.

GEM’s collection, as well as its studies of user behavior in using its site, reveals an awareness of the current needs of educators for resources that will aid them in the classroom.

**Global Education Online Depository and Exchange (GEODE)** – <http://www.uw-igs.org/> Maintained by the University of Wisconsin System’s Institute for Global Studies, GEODE provides users with access to over 130 educational resources on Global Studies. Users may submit resources and create metadata using a simple form.

**Harvey Project** – <http://harveyproject.org> This site provides users with access to 636 interactive materials within the domain of Physiology. The materials are created for college and medical students. Materials can be browsed by subject. Materials are also classified according to domains within physiology.

**Health Education Assets Library (HEAL)** -- <http://www.healcentral.org/index.htm> Conceived in 1998, and having begun its collection development in 2002, HEAL

provides “building-block multimedia items such as images, videos, and animations, and textual materials such as cases and quiz questions.” Its current prototype collection of over 1,000 materials contains resources useful to medical students and medical professionals. The collection will eventually contain materials of use to all educational levels. The collection currently contains images and interactive tutorials.

HEAL takes submissions of materials from users as long as the submitter includes information on the copyright status of the materials, the resource can be viewed directly through a browser, and meets the needs of learners and educators as described by the project. Submitted materials are reviewed by the HEAL staff to discern their compliance with HEAL requirements.

Submitters of materials make use of a cataloging interface that enforces compliance with the HEAL metadata standards, which builds on the IMS Metadata specification. HEAL’s metadata also includes fields relating to resource attributes of interest to persons in the medical professions or education, such as SpecimenType and Organ. HEAL provides visitors to its site with examples of the XML format of its metadata records.

Submitters of materials and of metadata may specify the controlled vocabulary they are drawing on for their keywords. MeSH is recommended to users and many of the resources already cataloged within the collection are cataloged using MeSH vocabulary. HEAL also provides a guide to the MeSH vocabulary for those using it to describe submitted resources.

**Humbul Humanities Hub** -- <http://www.humbul.ac.uk/> Developed in 1999 by the University of Oxford’s Joint Information Systems Committee – Arts and Humanities Research Board, the Humbul Humanities Hub is a catalog of humanities resources online. The project hopes that its site will be the “first choice for accessing online humanities resources.”

Humbul refers to a variety of materials through its repository. Collecting materials to be used primarily by educators and students Humbul has put together a collection that includes educational materials and links to academic institutions, as well as academic research projects, and such various resources as the Web pages of companies producing educational software.

Materials within the Humbul collection are submitted by users. Users submit a URL, which is then reviewed by on-site staff, who then passes materials on to a subject specialist cataloger.

Humbul metadata are based on the Dublin Core metadata element set. Humbul’s guide for catalogers of materials includes a description of various metadata fields as well as rules for recording author and institutional names. Dublin Core controlled vocabularies are used for resource types.

Humbul has an RSS feed for announcing new records. Humbul is also compliant with the RDN (Resource Discovery Network) interoperability and Standards Framework, which allows its records to be searched along with those of other collections at the RDN site. RDN is a service of JISC (The Joint Information Systems Committee).

**ICONEX** – <http://www.iconex.hull.ac.uk/interactivity.htm> A project funded by the UK's JISC, ICONEX investigated the “key issues surrounding the identification, description, location, use and integration of interactive content through technical development, national consultation and exemplar aggregation.” While no longer conducting research, the project's site provides users with access to 77 resources on a variety of academic subjects, most of which are interactive learning materials.

**iLumina** – <http://www.iLumina-dlib.org> Funded by the NSF, iLumina provides access to nearly 1,500 materials useful for undergraduate teaching of Chemistry, Biology, Physics, Mathematics, and Computer Science. After submission, materials and metadata are reviewed by an editor. Metadata is assigned using a series of forms and drop down menus that enforce standards compliance. Repository metadata are based upon IMS Metadata specification and Dublin Core. iLumina classifies materials using a “modified” set of Library of Congress subject headings for Chemistry, ACM/IEEE Computing Curricula for Computer Science, and its own system for Mathematics and Physics.

**Interactive Dialogue With Educators from Across the State (IDEAS)** – <http://ideas.wisconsin.edu/> The IDEAS collection is made up of materials selected by PK-16 educators from Wisconsin. Working in teams to identify, evaluate, catalog, and align resources to state educational standards, these educators have created a plan made up primarily of lesson plans and reference materials.

**LearningLanguages.net** – <http://www.learninglanguages.net> LearningLanguages.net is a portal that brings together online foreign language resources for English-speaking K-12 students and teachers of French, Spanish and Japanese. The project was created and is maintained and enhanced by staff at the Internet Scout Project. The project was initially funded by the Claire Giannini Hoffman Fund. “Content experts scour the web every week for the best resources, and then describe and catalog them in order to make them accessible.” Production of Metadata follows a metadata schema based on the Dublin Core Metadata Element Set. The project uses the Scout Portal Toolkit to create a searchable portal to selected resources.

**The Learning Matrix** -- <http://thelearningmatrix.enc.org> Funded by the Eisenhower National Clearinghouse and the National Science Foundation the Learning Matrix collection provides access to over 4,000 online resources useful to teachers of science and mathematics, or providing instructional and pedagogical training. Learning Matrix resources promote “inquiry and problem based learning in college mathematics, science, and technology classes.” According to the project's own literature the collection contents range from “simulations and tutorials to research articles and video footage illustrating excellent teaching techniques.”

Resources are submitted by users who are able to fill in a select set of metadata fields. Records are then passed through the hands of a cataloger who inputs other fields, and a reviewer, who reviews the fields created. Quality control is enforced by a body of subject experts. The project has 5-6 full time catalogers dedicated to creating metadata records for submitted materials.

Metadata for the Learning Matrix use Dublin Core and IEEE LOM elements. The IMS Learning Resource Metadata Specification is also drawn on. To better describe multimedia objects indexing protocols follow a modified POOL-IMS Version 1.0 that is itself based on the IMS Specification.

Learning Matrix records are transformed using crosswalks to create various forms of record formats, including MARC. The Learning Matrix uses its own controlled vocabularies to describe resources.

Learning Matrix records are harvestable according to OAI Protocols for Metadata Harvesting. Learning Matrix records are harvested by many groups, including GEM and NSDL.

Learning Matrix records are descriptive and detailed. In the words of its director, “it is labor intensive to have consistent, richly described resources, but the potential benefits available through a digital library are significantly increased when the most precise metadata schemas are implemented.”

**Learning Object Repository, University of Mauritius** – <http://vcampus.uom.ac.mu/lor/index.php?menu=1&cat=10> Established to collect learning resources from the University of Mauritius and elsewhere, this English language site, containing materials in both English and French, provides users with access to over 300 learning materials on various topics for students at college level and higher. Submitters, the population of which is restricted to faculty and invited “guests,” submit resources and create descriptive metadata.

**Learning Objects, Wesleyan University** – <http://learningobjects.wesleyan.edu/> This project is developing a repository that will be integrated into a wider strategy for encouraging use of digital content in the education environment. “Having invested in the past five years to build a state-of-the-art network and classroom infrastructure, we propose to create a team of three full-time professionals that will work closely with our faculty over a five-year period to develop learning objects that can be integrated into the curriculum. Rather than focusing on enabling faculty to become self-sufficient in developing and maintaining their own course materials, this team will provide a new type of support for the integration of technology into the curriculum by acknowledging the necessity of specialized professional support staff and services to collaborate in the development of course materials.”

**Maricopa Learning Exchange (MLX)** – <http://www.mcli.dist.maricopa.edu/mlx>

Established by the Maricopa Community Colleges in Arizona the Maricopa Learning Exchange provides users with access to over 500 materials on various subjects. Materials, submitted by users within the Maricopa community college network, ranges from teaching materials and pedagogical tips to links to sites containing educational content. The site has an RSS feed to allow communication of new records. Users are permitted to comment on resources.

**Menagerie** – <http://morty.uts.ohio-state.edu/menagerie.htm> Sponsored by TELR (Technology Enhanced Learning Resources) at The Ohio State University, the Ohio Board of Regents and the Dept. of Education, Menagerie has developed 8 interactive learning resources. The subjects assigned to these materials reflect the project's desire to locate subject matters that encourage reuse. The subjects for these learning materials are: Information Literacy, Life Sciences Processes, Scientific Reasoning, and Humanities.

**Multimedia Educational Resource for Learning and On-Line Teaching (MERLOT)** -- <http://www.merlot.org> Developed in 1997 by the California State University Center for Distributed Learning, MERLOT provides users with access to online learning materials through a collection of records that now totals over 8,000.

Many materials described within the collection are peer reviewed by onsite staff and rated by users. Materials can also be collected by users into collections of recommended resources, or listed along with assignment or project concepts that use the listed resources.

MERLOT metadata records, the structure and fields of which are developed from the IMS Learning Resource Metadata Specification, are created by users submitting resources. MERLOT has developed a one page form for assigning metadata. The form enforces compliance with controlled vocabularies using drop down boxes and check boxes.

MERLOT has a number of editorial boards, one for each of its classifications of academic disciplines (i.e. Biology, Business, Chemistry). These editorial boards, using guides established by MERLOT, review submitted resources according to such criteria as ease of use, clearness of instructions, design quality, and usability. Peer reviews grant materials a rating distinct from the ratings provided with users and act as a sort of "seal of approval" for the best of the collection's resources. Peer review is not required for materials to be listed with MERLOT's collection.

MERLOT has recently provided an RSS feed of recent additions to its collections. RSS files are made up of descriptions of the resources referred to with a link to the MERLOT record that further describes and classifies the material as well as listing reviews and ratings, as well as collections or assignments that the resource may be part of.

MERLOT also hosts the Community of Academic Technology Staff, a group dedicated to exchanging materials and information in the interests of increasing “knowledge, productivity, and professional effectiveness in service of academic technology.”

**National Engineering Education Delivery System (NEEDS)** – <http://www.needs.org>

NEEDS is a digital library of resources for educators and learners within education. Records are drawn from various smaller collections. Cataloging records contain multiple searchable fields including type of learning resource and publication year. Metadata is based on IEEE LOM. The collection will soon be searchable by user education level and for the existence of peer reviews.

**National Learning Network (NLN): Materials --**

<http://www.nln.ac.uk/Materials/default.asp> The National Learning Network, a government-supported project based in the UK, was inaugurated in 1999 to encourage the adoption of Information and Learning Technology in post-16 education. The NLN collection, which was launched in 2001, exists in order to provide high quality materials with which to encourage this adoption. This collection is intended to eventually contain a large variety of materials, including lesson plans.

The NLN collection currently contains roughly 500 interactive browser based resources for online learning. User capacity to search resources is limited. Resources are best accessed through a subject list that can be browsed or users can keyword search for resources.

Use and downloading of NLN materials is unrestricted for users within the UK, with the exception of Wales. The materials themselves are developed by the NLN Materials Team according to standards that ensure that the materials are “highly engaging, accessible and interoperable.” The materials have been developed to meet the needs of different learning styles.

Materials are reviewed by a staff of quality assessors who “take part in the rigorous trialing process that ensures the NLN e-learning materials are of a high standard before they are released to the sector.”

NLN uses the BECTA (British Educational Communications and Technology Agency) Metadata Requirements, based on the IMS Metadata specification, to apply metadata to its resources. Subject classifications for materials use the LearnDirect classification system, developed from the Superclass II classification system.

NLN staff includes a corps of Subject Mentors who perform outreach for NLN and its materials. In visits to schools and universities these persons demonstrate their knowledge in their subject area as well as their skill in the use of technology for online learning. Through their presentations and examples, educators become familiar with the materials available through NLN and the ways they can be exploited during the teaching process.

**National Science Digital Library (NSDL) –**

<http://nsdl.org/render.userLayoutRootNode.uP> The NSDL was conceived of in 1995 in a concept paper for the NSF Division of Undergraduate Education. In 2000 the NSDL program held its first funding cycle during fiscal year 2000. Since then, NSDL has funded 119 projects to create collections and services for teachers and learners of all educational levels, and research the application of digital libraries to education. The NSDL Web site is a portal to the collections of its many partners. To be searchable through the NSDL site partners must create metadata records that use the Dublin Core Metadata Element. Records from partner projects that are searchable from the NSDL site must be compliant with the OAI Metadata Harvesting Protocol.

**Open CourseWare Initiative, MIT –** <http://ocw.mit.edu/index.html> MIT's Open CourseWare Initiative is a "large-scale, Web-based electronic publishing initiative" funded by The William and Flora Hewlett Foundation, the Andrew W. Mellon Foundation, and MIT itself. It has been created in order to "Provide free, searchable, access to MIT's course materials for educators, students, and learners around the world." The project has placed materials for 500 classes, including Syllabi, Course Calendars, Readings, Lecture Notes, Assignments, and Exams, online. The OCW's metadata is based upon IMS Metadata Specification.

**Scottish Electronic Staff Development Library (SeSDL) –**

<http://www.sesdl.scotcit.ac.uk> SeSDL is a resource center "designed to encourage the sharing and reuse of staff development materials." The contents are intended to encourage the use of communications and information technologies in education and individual learning. The materials in the current collection relate to the use of technology in teaching.

The collection is made up of "granules," the "smallest individual components into which educational materials can be divided." As the project staff writes, "Granules may be composed of as single file, or a collection of files including text, diagrams, video sequences, interactions, etc." Granules can be drawn together using a Course Design tool provided by the site itself to create lessons. The collection currently contains 8 lessons made up of 96 granules. Use of materials is restricted to individuals within member Scottish institutions of Higher education.

Guides are provided for the creation and design of granules, presenting rules regarding granules referring to other granules, rules for navigation among granules, and the bundling of files within them. Users may update materials themselves, making versioning the responsibility of the creator. The projects metadata are developed from the IMS metadata specification. A subject taxonomy and controlled vocabulary has been developed, drawing from the British Education Thesaurus.

**SMETE Digital Library –** <http://www.smete.org> The SMETE Digital Library is a portal for the SMETE (Science, Mathematics, Engineering and Technology Education) Open Federation to a collection of materials of use to educators, learners, and policy makers. SMETE is currently developing a number of services for its collection including a

personalized recommendations system “based on an analysis of both the usage patterns of a learning resource (measured as a function of the “reading time” of the resource) as well as the semantic similarity between resources.” SMETE is also developing a cataloging tool to produce metadata within an XML document using an HTML based interface. The project is also “developing a standard for user profiles so that participants in the SMETE Open Federation can share user profiles [when permission is granted] across libraries for purposes such as collaborative filtering systems, digital rights management and user comments and reviews.”

**Telecampus Online Course Directory –**

<http://courses.telecampus.edu/about/index.cfm?fuseaction=introduction> Organized by NBDEN Inc., Telecampus is a directory of over 60,000 online courses and resources available from pay and free collections. Materials range in length from one hour modules to full semester of year long courses. Materials cover a wide range of subjects and educational levels.

Institutions with collections of online courses and materials apply for inclusion in the Telecampus directory. All materials are from accredited institutions. Metadata applied to materials build off of IMS metadata.

**Wisconsin Online Resource Center –** <http://www.wisc-online.com/index.htm> The WORC is a project established by Wisconsin’s 16 technical colleges to “accelerate the development of quality online courses while, at the same time, minimizing the cost of course development by identifying and sharing best practices.” The WORC collection is made up of over 900 interactive browser-based educational materials on a variety of subjects taught within the Technical College system.

Materials are created through collaboration between course developers and the project’s technical staff. After course developers submit outlines for materials the staff then develop the learning material in an interactive format that is standard throughout the collection. After review by faculty, the material is placed on the Web. Materials can be located by browsing through the site’s subject classifications. Materials cannot be copied and are to be accessed through their URLs when used in courses.

## **E-Learning and Repository Projects**

**AEShareNet** – Established by the Australian Vocational Education and Training Sector, AEShareNet is an Australian collaborative system to manage intellectual property using a system of standard, customizable licenses as well as legal structures governing agreements among participants. The project's site offers a searchable database of available training materials, which must be accessed and purchased by contacting the creator, and a forum for users to exchange licenses to use and adapt materials.

**Educause Virtual Community of Practice** – The National Learning Infrastructure Initiative's Learning Objects Virtual Community of Practice is working towards the creation and encouragement of collaboration supporting and extending "investigation by the greater academic and business community into issues about and attributes of learning objects and the broader management of knowledge."

**Splash** – Splash is a downloadable desktop client. Using the P2P POOL Protocol, various Splash clients create a single distributed repository. The administrator of each downloaded Splash application enters in metadata and references to materials on their application. Metadata is then searchable and readable by all persons on the network. A series of forms and drop down boxes enforce use of CanCore Metadata.

**Talon** – The TALON project, sponsored by Indiana University and the Open University of Malaysia, is to develop a number of learning object templates that educators can place their content in. The developers of the system have devised a number of simple single projects that involve word choice, drag and click visual interfaces, and the determination of the logical order of concepts. The project is also developing tentative resources for determining a learner's learning style. The project has developed 17 templates.