Briefing Document on Learning Objects & Learning Object Repositories

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for the

Global Learning Object Summit
Planning Meeting
San Francisco, California
September 3-4, 2002

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PART I
OVERVIEW OF E-LEARNING AND LEARNING OBJECTS

Researcher’s Notes: A review of the literature clearly indicated considerable attention to learning objects and learning object repositories. There are hundreds of articles and papers focusing on or referencing learning objects and repositories in general. Three key papers, each written for an educated but broad audience, are summarized here.

Into the Future: A Vision Paper
Wayne Hodgins
Written for the Commission on Technology and Adult Learning, Wayne Hodgins paints a futuristic picture of technology, adult education, and what he terms “learnativity.” According to Hodgins, the direction of technology, the knowledge needs of society, and global economic forces are converging in a dramatic manner. History is at a point where the seeds of “learnativity” are nascent but brimming with potential if individuals, organizations, and nations are able to keep their minds open to the possibility of the opportunities created by the direction, needs, and forces just mentioned. Learnativity “is a new way of being that fuses learning, working, creativity, and knowledge creation into a synchronous state” (p. 16). The term is meant to describe a state of affairs wherein everyone is problem solving, working, planning, communicating, and learning “all at once and all at the same time.” The concept of learnativity includes this fusion of human activities, technological developments, knowledge needs, and global forces.

The paper focuses on four elements of learnativity:

1) performing tasks and measuring competence
2) capturing and utilizing knowledge
3) managing knowledge in its increasing complexity, and
4) changes in learning offerings.

The sections on capturing knowledge and managing knowledge are most relevant to learning objects and learning object repositories (see pages 26-31). Here, Hodgins covers the nature of learning objects, metadata, interoperability, standards, and various implications for the future. This section is nicely interwoven with the remaining three elements of learnativity. Of particular interest are the “Points to Ponder” asked at the end of the sections. The questions are categorized as follows: Work & Learning, Individuals, Teams, Organizations, and Policy & Practice.

In general, Hodgins’ paper touches upon many of the relevant issues to be discussed in Part III of this report. It is broken up into readable chunks and written for a general audience that may or may not understand why learning objects are important or how learning objects are connected to current developments in technology, learning, training, and human development. The vision paper’s utilization of “learnativity” provides a
concept by which to think about strategic measures for reaching a prime state of human, technological, and learning convergence.

For the full text, see http://www.learnativity.com/into_the_future2000.html

**Learning Without Limits, Vol. 3**  
*Informania, Inc.*  
**David Brightman**, *Ed.*

This monograph contains several articles providing perspective on many of the concerns articulated by Hodgins. However, the authors in this work focus on the growing demand for electronically delivered learning materials for continuous and easily accessible work force development and professional training. That is, they focus on the implications of Hodgins’s learnativity from an organizational standpoint. For example, Ellen Wagner examines e-learning “as the site where knowledge management, information technology, and cognitive strategies converge” (p. 4). Like Hodgins, Wagner is interested in trends, calling special attention to an increased focus on competency-based approaches to instruction. The articles by Gena Tusso and Warren Longmire discuss the technological requisites needed to achieve competency-based learning outcomes. David Brightman provides two case studies illustrating the relationship between electronically mediated learning and performance-based learning outcomes.

Wagner’s article “E-Learning: Where Cognitive Strategies, Knowledge Management, and Information Technology Converge” ties learning needs to organizational needs, and organizational competencies to individual-learner centered competencies. New technologies and work force needs, she argues, should be studied closely in order to develop organizational learning strategies. She briefly covers learning objects, metadata, and pattern templates as effective e-learning implementations. The case studies articulated by Wagner provide real-life examples of the benefits and challenges of applying new learning technologies to competency-based models for real-world needs. The case studies include initiatives for the Western Governors University and Komptansenetet: A National Competency-Based Professional Development Network (see pages 43-49).

For the full text, see http://www.learnativity.com/lwol.html

**Learning Objects; Resources for Distance Education Worldwide**  
*Stephen Downes*

This article is rich and comprehensive. Downes begins with a quasi-historical analysis of the need for sharing learning materials as it has developed from an economic and technological standpoint. In discussing “older” and more “contemporary” forms of sharing learning materials, he provides a brief picture of the various efforts educators have headed to share learning resources. Discussion of learning objects covers not only the creation of objects but also how learning objects are constrained by funding, time, and attention.
Working from a theoretical perspective, he discusses the challenges of holistic course construction, the limited use of objects contained in such systems, and the need for Rapid Application Design (RAD). In discussing object-oriented design, open standards, the IMS protocols and SCORM illustrations, he uses graphs and charts serve to flesh out the activities currently underway in the learning object, e-learning world. The second half of this sophisticated article focuses on the authoring of learning objects as it relates to data, multimedia, design, templates, and learning management systems. Especially helpful to understanding delivery of learning objects is his discussion on learning object repositories, XML, XSL, and HTML. Again, graphs and illustrations are provided to illustrate the work being done to improve electronic delivery of leaning content.

In general, Downes is concerned with the problem of how older modes of sharing instructional material pose time and funding constraints on programmers, course developers, content designers, and instructors. His main justification for streamlining the production of learning material into learning objects concerns his perspective that many subject offerings suffer from unnecessary duplication. Professors offering similar courses continually and perhaps needlessly recreate similar materials. He believes it is to the benefit of traditional instruction, teachers and students, and to the “distance learning” world that reusable, manageable, discoverable learning objects be created to promote higher quality learning objects, efficiency, and personalized learning offerings.

For the full text, see http://www.irrodl.org/content/v2.1downes.html.
POLICY

...national or institutional policies, rules, and practices that encourage or inhibit the development of learning objects and repositories...

Questions for Discussion:
- How do national and international policies serve as barriers to the development of a learning object economy?
- What gaps exist in current policy that must be addressed to stimulate the development of a robust learning object economy?
- How can institutional and organizational policies stimulate or inhibit authorship of learning objects?
- What is the most important change needed in the area of policy?

Researcher’s Notes: Considerable information exists on copyright law and intellectual property rights, as well as a good amount of literature on the implications of technology for traditionally conceived authoring rights. Literature focusing specifically on the policy implications of learning objects and learning object development, however, was very hard to find. The following documents and articles may be useful in stimulating discussion about further research into national or institutional policies, rules, and practices that affect the development of learning objects and repositories.

Carol A. Twigg
This article is the result of a symposium comprised of faculty, administrators, lawyers, and business representatives and focuses on two questions: 1) who owns learning materials? and 2) how can institutions encourage faculty to create learning products of the highest quality that can be marketed in such a way that both the university and the faculty benefit at some level? Twigg begins her discussion of intellectual property rights of electronic material with four case studies to bring out current legal and policy issues. The article concludes with its recommendations for resolving issues about faculty and institutional property rights over knowledge products and processes.

The first case is about super-star faculty and describes a Harvard professor who placed one of his courses on a CD ROM for sale to a virtual university. The central issue is whether the faculty or the institution owns the product. The second case is about the use of an institutional brand name; this study focuses on the case of UNext.com, a company
that pays universities for the authorization to use their name and the names of the professors to sell their product. The central issue concerns whether any academic values might be threatened. The third case is about CaseNET, a university-based project providing colleges, universities, and school districts a resource from which to purchase scenario-based materials and case studies. The significance of this case is that faculty or departments can run knowledge-based businesses from within the structure of the host institution. The question is raised about the integrity of the institution as it relates to faculty and department quality. The fourth case study concerns the Math Emporium, a Virginia-Tech computer facility that teaches calculus to large numbers of students at one time. Through this instructional use of technology, the need for instructors is reduced, with fewer “facilitators” needed to complement the individualized computer sessions.

In the latter half of the paper, a helpful distinction is made by the symposium between what constitutes a “course” and what constitutes “course material,” a distinction that is consonant with debates about the nature of learning objects and their components. Two myths are dispelled. First, contrary to much of the literature available on knowledge economics, profit forecasts about the lucrative possibilities of knowledge products are dismissed. Second, the concern that faculty will be replaced by CD ROM-based courses they themselves create is also dismissed.

Of interest in this article is the symposium’s argument about the law on intellectual property rights. Simply stated, their view is that there is no real overriding precedent for either faculty rights to intellectual property or institutional rights under the works made for hire law. The consensus among those in the symposium is that faculty intellectual property rights should remain in the power of the faculty, the knowledge product creators, while allowing the ability of the hosting institution to exercise certain rights, without obtaining permission from the copyright owner. A list of the recommended rights is provided on the last page. It is worth underscoring the consensus among the symposium participants that faculty and their institutions will be best served by working things out among themselves, using the law only as a means to goals established before legal or policy consultation.

For the full text, see http://www.center.rpi.edu/ResMono.html

The Teacher’s Outrageous Claim of Intellectual Property

David Wiley

In this article, the author argues that the very idea of intellectual property is incompatible with the idea of teaching. Citing a recent California law prohibiting unauthorized posting of class lecture notes, he argues that the Internet is an egalitarian facilitator of education opportunity through resource distribution. His point is that learning is a social activity and that old fashion notions of learning are outdated. Wiley’s clear position is that teaching is synonymous with sharing, and as evidence that he “walks the walk,” he posts all of his work for immediate access on the Internet.

For the full text, see http://wiley.ed.usu.edu/docs/teachers_claim.html
Fair Use Guidelines for Educational Multimedia

Chris Dalziel

In this article, the author, Executive Director for the Instructional Telecommunications Council, discusses the problem of faculty use of copyright material in educational multimedia presentations. The solution he offers is a set of guidelines developed by a working group of representatives from college and university media centers.

The guidelines allow for the following:

• an instructor may use copyrighted material for instructional purposes for up to two years before he or she must ask for permission to use it (this may be thought of as a kind trial period or free-use period); there are some limitations on the amount of copyright material one can use in a given presentation

• those wishing to commercially reproduce multi-media objects must first obtain permission

• whether a commercial or educational interest, those wishing to use copyright material should seek permission to do so as early possible for practical purposes

• when the instructional presentation is unfinished and contained in a limited access system, copyright permission is not required (i.e., so long as the instructional presentation is still in development and set within a closed system, copyright permission need not be obtained)

For the full text, see http://www.libraries.psu.edu/mtss/

Report on Copyright and Digital Distance Education.

US Copyright Office (1999)

The focus of this special report required under the Digital Millennium Copyright Act (DMCA), was on Section 403 (Limitations on exclusive rights; distance education) of the DMCA. Both the Act (95 pages) and the report (well over 300 pages) are lengthy and highly technical. This summary highlights topics from the Report’s executive summary that may be of relevance to learning objects and repositories.

The report looked at problems in licensing copyrighted works, including locating copyright owners; the inability to obtain responses from copyright owners; and unreasonable prices. A related section focused on solutions to licensing problems, including using technology to protect works; using electronic copyright information systems; and creating an on-line licensing system. Additionally, technological security for distance education was discussed, and strategies such as creating a viable protection technology and having some way of limiting student access to information are included in the report.

The report notes that an example of creating a viable protection technology device would be a secure container. This device would allow the copyright owner to set rules for use of the work, and the rules would be attached to the copies of objects being accessed. (One example currently in use is the “view-only” access mode; many publishers let clients access materials via this mode before products go on the market.) Another example is the
digital watermark. Watermarks provide a means by which copyright owners can track the use of their product along the chain of its use.

A major focus of the report centers on applications of the Copyright Law to distance education. The authors point out that decisions to use copyrighted material may be based on explicit consent from authors or may simply invoke an exemption policy. Relevant sections of the law are Sections 107 and 110. The intention of the law reflected in Section 110 is “to cover all of the methods by which performances or displays in the course of systematic instruction take place.” Review of Section 110 indicates two exemptions from copyright law. The first concerns use of materials in a face-to-face, traditional classroom situation. The Section indicates that this use of copyrighted material does not require authorization. The second concerns performance or displays in instructional broadcasting. Both have certain limitations in the law. These limitations are primarily concerned with pre-digital forms of communication and instruction. Because only acts of performance and display are addressed, it does not authorize acts of reproduction or distribution. This is significant given the ease of such activity with digital technology and new concerns with the design, development, and reconfiguration needs of ideal learning objects. Section 107 covers fair use, which is a broad and general limitation.

It should be noted that the international context of copyright policy is even more unclear given that legal jurisdiction had not been settled at the time that this document was written. However, the United States has signed two major treaties with respect to copyright: The Berne Convention and the TRIPs Agreement.

While most of the analysis in the Report was speculative at the time it was written, one very encouraging statement included the following:

*As a fundamental premise, the Copyright Office believes that emerging markets should be permitted to develop with minimal government regulation. When changes in technology lead to development of new markets for copyright works, copyright owners and users should have the opportunity to establish mutually satisfactory relationships.* (xiv)

Other points of interest regarding the Report include the following. First, the Copyright Office recommended that exemptions of performance and display be broadened to include digital transmission and the rights of reproduction and distribution. Another point of interest regards the centrality of mediated instruction. This is the idea that the law protects copyright owners by making access to their work analogous to the manner in which such works are accessed in a live classroom. Indeed, one requirement that the Copyright Office recommended for elimination concerns policy on the physical classroom. An additional recommendation is that the scope of copyright policy be expanded to include categories of works covered beyond nondramatic and musical works.

For the full text, see [http://www.loc.gov/copyright/disted/](http://www.loc.gov/copyright/disted/)
Propagate Project

*Education Network Australia*

The Propagate Project (now completed) was established in late 1996 by two Australian Cooperative Multimedia Centres (Access CMC and Impart Corporation) with a grant from DETYA to work on ways to solve the many issues surrounding copyright and multimedia. The Propagate project team collaborated closely with counterparts working on the Imprimatur Project, supported by the European Union, which had done pioneering work in developing consensus-based abstract classifications for the various roles involved in trading intellectual property. Imprimatur had also developed a number of business and process models for various markets using these classifications.

Propagate aimed to solve the rights management problems of multiple media types in a digital environment and the reuse issues that is emerging in sectors such as education, science, and research. Propagate built on the Imprimatur project's abstract language and market business models, and in a coordinated effort, developed an architecture for managing and trading rights and the assets to which such rights are attached.


Imprimatur Project

*European Union*

The Imprimatur project was co-ordinated by the Authors’ Licensing and Collecting Society (ALCS), an organization in Britain which represents the interests of authors. In English law, the term Author embraces a wide variety of creative disciplines. The project was launched by The European Commission DG III under the ESPRIT program and is now complete.

The Imprimatur acronym spells out: Intellectual Multimedia Property Rights Model And Terminology for Universal Reference. This is because the project aimed to finish its life with a prototype (the rights model) that would work across all platforms together with internationally agreed standards defining its use (universal terms).

For additional information, see [http://www.imprimatur.net/index.htm](http://www.imprimatur.net/index.htm)

FUNDING

...models and priorities for stimulating the broad-scale development of learning objects and repositories...

**Questions for Discussion:**

- How have different countries used special funding programs to promote the development of learning objects and learning object repositories?
- What commonalities exist in the most successful funding programs?
- Where would new funding programs provide the greatest impetus to the development of a robust learning object economy?
- What is the most important development needed in the area of funding?
Researcher’s Notes: Research in this area proved most challenging. There do not appear to be any studies on funding models in general, much less any comparative studies of funding models globally. It may be that researching this area will require not only browsing for appropriate literature and web sites, but interviews with those in higher positions in education and government. Descriptions in quotes were drawn verbatim from the related web sites. By no means comprehensive, this listing is provided as an impetus for further discussion that may illuminate this area more fully.

AUSTRALIA
Department of Education, Training, and Youth Affairs (DETYA)
Finding information on Australian funding proved difficult but the information below may point the way to further, more in-depth research. One of the first documents discovered was the Collaborative Online Learning and Information Services (COLIS) project home page. It cites funding from the Department of Education, Training, and Youth Affairs (DETYA). The Online Guide to Resource Catalogs provides the following description of DETYA: “The scope of this project is to research and advise on issues related to technical standards relevant to information technology, online delivery, resource discovery and some aspects of information management in education and training in Australia in the context of international activities in these areas.” See [http://aflr.flexiblelearning.net.au/htmal/vet.html](http://aflr.flexiblelearning.net.au/htmal/vet.html).

The COLIS Workshop on Systems Interoperability in Higher Education was funded by DETYA and DETYA has provided additional ‘seed’ funding for the development of test bed applications that fulfill objectives related to learning objects, interoperability, and education. The Australian IMS Project web site notes that “the DETYA project funding described above is on behalf of the EdNA Reference (ERC) in preparation for the creation of an ERC Standards Sub-Committee.” (EdNA stands for the Education Network Australia). A description of EdNA is provided later in the report.

For more information on DETYA, see [http://www.detya.gov.au/](http://www.detya.gov.au/)
For more information on COLIS, see [http://www.colis.mq.edu.au/](http://www.colis.mq.edu.au/)

CANADA
Advanced Internet Development Organization (CANARIE)
Canada’s Advanced Internet Development Organization (CANARIE) is a not-for-profit organization supported by members, project partners, and the federal government. It has funded “numerous advanced Internet applications projects, providing some 500 companies with the opportunity to achieve business success through innovation.” The CANARIE web site states that “through its funding programs, CANARIE supports a variety of initiatives to develop innovative applications and technologies to advanced broadband networks. CANARIE supports projects that conform to principles of open systems and interoperability. To be eligible for funding, projects must be led by a Canadian organization and be carried out in Canada. Financial contributions from CANARIE are repayable if the project is successfully commercialized.”
The web site provides a summary of CANARIE's funding programs with a link to full information on each program. It should be noted that “each funding program is managed independently and has its own funding criteria, time frame, application process, and deadlines.”

Program categories include: E-content, E-business, E-learning, E-health, ANAST, and CA*net Institute. The total funds for each program are $6 Million, $28 Million, $28 Million, $5 Million, $8 Million and $900 K respectively. Specific time frames and typical amounts are specified.

Some achievements listed for 1993-2001 funding period (totaling $173 Million) include over 80 university connections, over 50 community college connections, and over 2000 school connections; work with 10 research centers; international connectivity with over 40 countries; and the support of over 200 projects with 500 participating companies.

For more information, see http://www.canarie.ca

EUROPEAN UNION
eLearning Initiative

“The ‘eLearning: Designing tomorrow’s education’ initiative is part of the comprehensive eEurope Action Plan, the aim of which is to allow Europe to exploit its strengths and overcome the barriers holding back the uptake of digital technologies. The executive summary notes that the effectiveness of education systems depends entirely on the effectiveness of the approaches to teaching and learning. In order to be effective, the introduction of information and communication technologies will have to be accompanied by a far-reaching reorganization of learning structures. The intention is to involve education and training players, as well as the relevant social, industrial and economic players, in order to make lifelong learning the driving force behind a cohesive and inclusive society, within a competitive economy.

“The eLearning initiative groups together specific measures within an education-oriented framework, in line with the wishes expressed by the Lisbon Council. Within this framework the European Commission is setting ambitious objectives to encourage action by the Member States and the relevant players and is also moving to support and coordinate their efforts at European level.

“The first aim of the eLearning initiative is to accelerate the deployment in the European Union of a high-quality infrastructure at a reasonable cost. The eLearning initiative also aims to step up the training drive at all levels, especially by promoting universal digital literacy and the general availability of appropriate training for teachers and trainers, including technology training as well as courses on the educational use of technology and management of change. The eLearning initiative places emphasis on creating appropriate conditions for the development of content, services and learning environments which are sufficiently advanced and relevant to education, in terms of both the market and the public sphere. The availability of standards is particularly important, as is the establishing of conditions conducive to change and to adaptation of the ways in which education and training systems are organized.
“The final aim of the eLearning initiative is to strengthen cooperation and dialogue and improve links between measures and initiatives at all levels — local, regional, national and European — and between all the players in the field.”


For more information on the actions and programs within the action plan, see http://europa.eu.int/comm/education/elearning/annex_en.pdf

UNITED KINGDOM

British Education Communications Technology Agency (BECTa)
“BECTa bridges educational and technological developments and communities in three broad areas: it seeks to evaluate information and communications technology (ICT) practice; it supports existing applications of ICT; and it investigates emerging technologies and associated pedagogy. As the Government’s lead agency on the use of ICT in education, Becta plays a crucial role in helping to maximize the benefits to all teachers and learners that using ICT can bring.

“BECTa's latest Corporate Plan sets out its work over the next three years in supporting the UK Government and national organizations in the use and development of ICT in education to raise standards, widen access, improve skills and encourage effective management. There are three essential strands which must be in place to ensure the success of ICT in education: an appropriate and sustainable Infrastructure of equipment and connectivity; relevant and quality Content; and skilful educational Practice to make the best use of these. BECTa’s work involves the strategic support and development of all three areas.”

For more information, see: http://www.becta.org.uk

Department for Education and Skills (DES)
“DES is a major source of funding for Ufi Limited and learndirect services. While Ufi is independent of the government, DES is a major stakeholder as it has committed millions of pounds for Ufi’s development phases. According to information on the Ufi website, DES is funding the development of Ufi’s infrastructure and services for 2002/03 at £67.25 million. £11.25 million has been allocated to support the learndirect National Learning Advice Line.”

For more information, see: http://www.ufiltd.co.uk/press/facts/default.asp

Learning Skills and Development Agency (LSDA)
“The Learning and Skills Development Agency is a strategic national resource for the development of policy and practice in post-16 education and training. The Agency was previously known as the Further Education Development Agency (FEDA). The LSDA provides a comprehensive training and conference program for education practitioners as well as managing a wide range of research and development projects and activities,
working closely with the Further Education and Learning and Skills sectors. The LSDA offers services and products through national and regional staff, operating within key business areas.

“The LSDA is the largest UK provider of training for governors, managers and practitioners in the Further Education sector. Events cover a wide range of strategic and operational issues, as well as a comprehensive curriculum program. The agency is also a leading provider of high quality research and development. LSDA works to support colleges' own internal research programs, as well as carrying out strategic research on behalf of the Learning and Skills sector.

“Ufi Limited signed a Memorandum of Understanding (MOU) with Learning and Skills Development Agency (LSDA) just this past June, 2002.”

For more information, see: http://www.lsda.org.uk/home.asp

**Joint Information Systems Committee (JISC)**
The Joint Information Systems Committee (JISC) web site indicates that it “promotes the innovative application and use of information systems and information technology in further and higher education across the UK.” The following is copied from the JISC web page: Funding for Projects

> The JISC runs directed funding programs which, from time to time, issue calls to the community in the form of JISC Circulars. These request bids to carry out projects on a range of technical and organizational issues to support the development and take up of Information and Communications Technology (ICT) in further and higher education. The JISC also makes requests for proposals for funding for specific projects.

> All further and higher education institutions are eligible to bid against these calls, either individually or in consortia. The JISC cannot accept bids for projects or other funding outside of this process, but is always receptive to suggestions for topics to be included in future calls, provided the resulting work is in line with the JISC's objectives and is widely applicable across further and higher education.

One organization funded by JISC is The Center for Educational Technology Interoperability Standards (CETIS). A description of the center is provided in the Appendices.

The following Research Councils are noted as currently providing funds to JISC:

- Higher Education Funding Council for England
- Learning and Skills Council
- Scottish Higher Education Funding Council
- Scottish Further Education Funding Council
- Higher Education Funding Council for Wales
- National Council for Education and Training for Wales
• Department for Employment and Learning

For more information about the JISC funding programs, see http://www.jisc.ac.uk/general/proj_funding.html

UNITED STATES

Department of Commerce

“The Department of Commerce offers a range of funding opportunities to business and education. The goal of the Advanced Technology Program (ATP) is to benefit the U.S. economy by cost-sharing research with industry to foster new, innovative technologies. As part of the highly regarded National Institute of Standards and Technology, the ATP invests in risky, challenging technologies that have the potential for a big pay-off for the nation's economy. The ATP views R&D projects from a broader perspective – *its bottom line is how the project can benefit the nation*. In sharing the relatively high development risks of technologies that potentially make feasible a broad range of new commercial opportunities, the ATP fosters projects with a high payoff for the nation as a whole – in addition to a direct return to the innovators.

“The ATP partners with companies of all sizes, universities and non-profits, encouraging them to take on greater technical challenges with potentially large benefits that extend well beyond the innovators – challenges they could not or would not do alone. Between 1990 and June 2002, ATP awarded $1.858 billion in funding to companies to develop high-risk, enabling technologies. Industry has matched this funding with $1.792 billion in cost-sharing. See http://www.atp.nist.gov/atp/

“The Technology Opportunities Program (TOP) promotes the widespread availability and use of digital network technologies in the public and non-profit sectors. As part of the Department's National Telecommunications and Information Administration (NTIA), TOP gives grants for model projects demonstrating innovative uses of network technologies. TOP evaluates and actively shares the lessons learned from these projects to ensure the benefits are broadly distributed across the country, especially in rural and underserved communities.

“To date, TOP has awarded 530 grants, in all 50 states, Puerto Rico, the District of Columbia, and the U.S. Virgin Islands, totaling $192.5 million and leveraging $268 million in local matching funds. TOP projects are nationally significant demonstrations of how digital network technologies can be used to extend and improve the delivery of valuable services and opportunities to all Americans, especially the underserved. By serving as models that can be replicated in similar communities across the country, TOP projects extend their benefits far beyond the communities in which they take place, and provide economic and social benefits to the nation as a whole. Congress appropriated $12.4 million for grants through the Commerce Department's Technology Opportunities Program (TOP) for Fiscal Year 2002.” See http://www.ntia.doc.gov/top/index.html
Department of Education
The Department of Education oversees a number of funding programs. The Fund for the Improvement of Postsecondary Education (FIPSE) considers proposals of all kinds under the Comprehensive Program, which supports “innovative educational reform projects that can serve as national models for the improvement of postsecondary education.” FIPSE encourages those with creative, innovative, collaborative ideas for improving teaching, learning, and access to higher education to consider FIPSE an ideal funding source. For more information on FIPSE, see http://www.ed.gov/offices/OPE/FIPSE/welcome.htm

Of special interest is the FIPSE-administered Learning Anytime Anywhere Partnerships (LAAP) Program. LAAP is grant program that “supports partnerships among colleges and universities, employers, technology companies, and other relevant organizations to create postsecondary programs that deliver distance education "anytime and anywhere." These programs are implemented on a national or regional scale and are innovative within the context of national trends in distance education.” LAAP requires that applicants have “at least two partners and a one-to-one matching of requested federal funds.”

In its first round, LAAP received 653 preliminary applications, of which 120 were invited to submit final applications, and a total of 29 received awards. For round two, LAAP received 395 preliminary applications, and invited 50 to submit final applications. Eleven projects were funded.

LAAP grants have averaged $1 million over the course of their funding. In FY 2000, LAAP will disbursed $15 million, with $4.3 million allocated to just the first year, for what could be up to four years of funding for new grants. The remaining monies supported continuing funds for round-one projects. A significant LAAP goal is to help institutions evolve from primarily text-based online courses to "good interactive pedagogy." See http://www.ed.gov/offices/OPE/FIPSE/LAAP/overview.html

The Gateway to Educational Materials program (GEM) is also funded by the Department of Education. Gateway provides on-line educational materials to teachers, parents, and administrators. See http://www.thegateway.org/

The National Science Foundation (NSF)
The National Science Foundation oversees a wide range of funding programs, and many of the NSF Directorates have funded projects related to learning objects and learning object repositories. The most visible effort is a program known as the National Science, Mathematics, Engineering, and Technology Education Digital Library Initiative (NSDL). Most authors would distinguish between the digital assets created through the NSDL and the kinds of digital assets which are classified as learning objects. The official synopsis of the program follows:

...Building on work supported under the multi-agency Digital Libraries Initiative, this program aims to establish a national digital library that will constitute an online network of learning environments and resources for science, technology, engineering, and mathematics (STEM) education at all levels. In FY2002, the program will accept proposals in three tracks: (1) Collections projects are expected to aggregate and
manage a subset of the library’s content within a coherent theme or specialty. (2)

Services projects are expected to develop services which support users, collection
providers, and the Core Integration effort and which enhance the impact, efficiency,
and value of the library. (3) Targeted Research projects are expected to explore
specific topics that have immediate applicability to collections, services, and other
aspects of the development of the digital library.

According to an NSF News document, 29 NSDL awards were made in 2000 totaling
$13.5 million. The awards for that year ranged in size from $160,000 to $840,000 over
two years. Projects listed include those activities which develop and organize subject-
specific content, coordinate content repositories, and develop services for users and
collection providers. See http://www.nsf.gov/home/grants.htm

EFFECTIVENESS

…the application of the science of measuring learning and learning-related outcomes
to the use of learning objects …

Questions for Discussion:

▪ Why has it proved so difficult to measure the effectiveness of e-learning?
▪ Are new theories of evaluation and assessment needed, or is the existing body of
  knowledge sufficient?
▪ What are the barriers to the incorporation of automated assessment and evaluation
  components into learning objects?
▪ What is the most important change needed in the area of effectiveness?

Researcher’s Notes: According to Butler and Sellborn, “very few journals summarize
the results of well-run experiments on the impact of technology, and little useful scientific
information is available on the Web” (p. 26). Review of an IEEE mailing list archive
reflects the concern about a lack of studies on the evaluation of “flexible learning:”

In 1998, John Eklund of the Faculty of Education at The University of Technology
(Syndey) stated that he was looking for “any papers reporting studies on the
effectiveness of IT for flexible learning” as most of the literature he had come across
appeared to report on the design and delivery aspects and not on the evaluation
projects.

A response from Scott Overmyer of Drexel University noted, “That’s a big problem
with our collective research—there isn’t much good evaluation, and few can be
decisive on what to measure and how to measure it, and what the results mean once
you have them.”

Chen-Lin c. Kulik and James A. Kulik conducted a meta-analysis of findings from 254
controlled evaluation studies showing a positive relationship between computer-based
instruction (CBI) and students outcomes. The work of Kulik and Kulik is often cited in
much of the literature on evaluating computer-based instruction (CBI). A scan of their
research indicates that they have done much work in the area of evaluating the effects of computer technology on education.

The summaries below may be indicative that more attention is being paid to the particular needs of and questions about measuring the effectiveness of electronically mediated learning. Consonant with one of the archived email comments above, there appeared to be more literature about the effectiveness of design and delivery of learning objects than about actual learning outcomes.

**Evaluation of Learning Objects and Instruction Using Learning Objects**

*David D. Williams*

In this paper Williams links questions about evaluation with questions about the use and design of learning objects. The first three pages raise a number of stimulating questions that are then discussed within subsequent pages of the paper. The questions are relevant to issues, problems, practices, and theories that may hinder successful design, implementation, and evaluation of learning objects. Williams has the reader use an actual learning object, a pan balance, as an object for learning about evaluating learning objects. He observes that “once the questions regarding audience and their values and criteria are addressed, evaluation methodology is relatively straightforward.” Assuming that this can be done, he focuses on steps of an evaluation sensitive to particular audience needs and values.

To set the stage for this discussion, Williams explores current thinking about evaluation; its relations to learning objects; and the nature of participant-oriented evaluation. Some of his basic points include the following: All evaluation boils down to the same end: “…comparing what something is to what it ought to be, in order to facilitate a judgment about the value of that thing” (p. 4). The challenge is to define the values of dimensions by which to describe or to decide “what” the object “ought to be.” After values to be used in the evaluation process have been clarified, standards or principles need to be set for the evaluation process.

One approach to a contextualized evaluation is the participant-oriented approach; basic to all models within this category is that they address diverse values in a fair and systematic way. Williams proceeds from this latter point to show how blending Stufflebeam’s CIPP (context, input, process, product) model with Patton’s user-focused approach creates a powerful meta-model by which to design evaluations that meet the greatest needs of the most people at each stage of William’s proposed evaluation model. The implications for application of the combined model are fleshed out with a hypothetical example employing the aforementioned pan-balance-as-learning-object. Shortly stated, Williams argues that the history of solid work in the field of evaluation suggests that the following three steps always be components of the design process for evaluation learning objects:

1) identify who will use and evaluate the learning objects;
2) assess how users define relevant learning objects and the criteria by which users judge them;
3) collect and use data about how the learning objects measure up to those criteria to make evaluation judgments in accordance with established meta-evaluation standards.

Shifting from questions about evaluation methodologies, Williams connects the developed themes to questions about learning objects. The concerns of instructors, students, and instructional support persons are discussed. While it is recognized that most research and development resides in the domain of instructional support services (including the work of instructional designers, librarians, technical specialists, etc.), Williams emphasizes that learners are “key users of evaluations of learning objects” (p. 14) and it is with this in mind that his paper continues.

He notes that at the heart of the evaluation task is figuring out 1) the users’ interest; 2) the user’s criteria for judging “evaluands;” and 3) the questions the evaluation might be organized around. Williams observes that one of the central reasons for attending to how diverse audiences define learning objects comes from a principle that context determines the value of a given learning object. Context makes learning objects meaningful to users; thus, evaluation must attend to this fact about learning objects and their judges.

Williams recognizes that value and interests conflicts may come into play, and for that reason, he notes that an evaluation process should allow users to make their decisions in concert with those of fellow users. The remainder of the paper provides guidelines for achieving such an outcome. An elaborate discussion of two alternative approaches to evaluating of learning objects based on a participant-model is provided: one is external and comprehensive and the other internal, immediate, and continuous.

For the full text, see [http://reusability.org/read/chapters/williams.doc](http://reusability.org/read/chapters/williams.doc)

**Measuring E-Learning: The Third Wave**

*Josh Bersin*

Bersin argues that e-learning is no longer simply a question of implementing or building content or an e-learning infrastructure but of finding and utilizing measurable business performance tools. In order to justify e-learning investments, Bersin encourages organizations to think of the investments not as training solutions but as performance solutions: What business problem needs to be solved? How can strategies be measured to assess whether or not you are solving the problem? Without asking what it is you want to achieve, measuring effectiveness or performance is difficult.

Examples of different performance goals are provided to show how different problems require different types of content, different levels of infrastructure, and different measurements. Bersin holds that decisions about measurement should be made at the outset so that evaluation is an on-going and formative process entailing attention to dynamic media, tracking, reporting, and other evaluation tools as needed. He concludes by noting that “today’s e-learning infrastructure is still immature in the tools to analyze and measure results.”

For the full text, see: [http://www.elearningmag.com/elearning/article/articleDetail.jsp?id=9554](http://www.elearningmag.com/elearning/article/articleDetail.jsp?id=9554)
**Approaches to Evaluation of Training: Theory & Practice**  
*Deniz Eseryel*

In this article, Eseryel focuses on the evaluation of training programs from a broad, organizational perspective. He lists several barriers to successful and thorough implementation of evaluation: costs, time and commitment, lack of expertise, blind trust in training solutions, and lack of methods and tools. After listing six general approaches to evaluation, he continues with the pros and cons of systems-based and goals-based approaches to evaluation of training. A table relates the levels of evaluation to the various evaluation models. Citing several US and European studies, Eseryel notes a lack of systematic, thorough, and consistent application of evaluation models to look at the effectiveness of instructional interventions.

The author makes the case that automated expert systems could be applied to the creation of instructional evaluations. Automation might include not only the planning process but the data collection process as well. After receiving input from the evaluator, the expert system could guide the expert through the purpose of the evaluation, type of objectives, level of evaluation, type of instructional objectives, type of instructional delivery, and size and type of participant groups. Esyrel notes that in such a system it will be important to tag evaluation data, individual performance data, and revision items to learning objects in a training program to realize an effective expert evaluation system. In other words, course design, learning objects, and evaluation design and processes should be fully integrated to properly measure training or learning effectiveness.

For the full text, see [http://ifets.ieee.org/periodical/vol_2_2002/eseryel.pdf](http://ifets.ieee.org/periodical/vol_2_2002/eseryel.pdf)

**New Directions in Evaluation of the Effectiveness of Educational Technology**  
*Walter F. Heineckde, Lara Blasi, Natalie Milman, and Lisa Washington*

An outgrowth of the 1999 Secretary’s Conference on Educational Technology, this white paper focuses on the evaluation of technology-based instruction in primary and secondary schooling. The following are listed as fundamental questions:

- How does technology impact student learning?
- What can we know about the relationship using data and tools available?
- What can we learn about the relationship in the future with new tools and strategies?

From a systems perspective, the authors discuss recent changes in evaluation practices; the need for new and expanded definitions of student learning outcomes; and the evaluation of new visions of technology teaching and learning. The authors take the position that until policy makers and school officials can decide on the purposes of educational technology, there is little point in trying to evaluate it.

The authors argue that what should be measured should not be limited to experimental standards-based models but may need to include more complex, contextual performance-based evaluation methods: “Perhaps we should be developing technologically based performance assessments to measure the impact of technology on student learning.” The
goal is to think about broader and deeper learning outcomes that technology may facilitate such as higher order or metacognitive thinking skills. What needs to be worked out then is the purpose of education technology, so that those involved can decide what it is that will be measured, how it will be measured, and when.

They note that “just as technology has caused us to reevaluate the nature of knowledge and instruction, it prods us to reevaluate the forms of evaluation that are brought to bear when examining educational technology.” The authors comment that new tools are needed to measure the instructional/learning effectiveness of technology. In agreement with others cited in this report, the authors call for an increase in formative approaches to evaluation given the ever-changing nature of technology.

In short, the authors argue that the question is not whether educational technology works but when and under what conditions it works. This leads to questions about when and by which methods learning technologies should be evaluated for learning outcomes. The paper concludes with recommendations for increasing formative practices.

For the full text, see: http://www.ed.gov/Technology/TechConf/1999/whitepapers/paper8.html

PEDAGOGY/ANDROGOGY

…the art of applying learning objects to learning situations and of assessing learning…

Questions for Discussion:

▪ How has e-learning been influenced by the principles of instructional design?
▪ Are new theories of instructional design needed, or is the existing body of knowledge in pedagogy and andrology sufficient?
▪ What are the barriers to the broad-scale use of pedagogical and andrological practices in the development of learning objects?
▪ What is the most important development needed in the area of pedagogy/andrology?

Researcher’s Notes: Literature relating the concerns and issues of pedagogy to electronically mediated learning was quite abundant and easier to find than literature regarding the other focus areas. While most literature appeared to focus on e-learning in general, there did seem to be some discussion of instructional design and learning theories relevant to learning objects and learning object repositories. However, as David Wiley noted in his work, there appear to be few examples of solid educational research that focus on the dynamics between learning and learning objects.

Several themes found in the literature included the following:

▪ contextualization and reusability
▪ andrological versus pedagogical approaches to object design and delivery
▪ the need for content design to incorporate learning theory and instructional design theory
A number of authors and researchers were frequently cited throughout the literature; they include Bloom, R. Gagne (The Conditions of Learning), D. Wiley (multiple works), Wayne Hodgins (multiple works), E. Langer (“The Power of Mindful Learning”) and David Merrill (multiple works).

Connecting Learning Objects to Instructional Design Theory: A Definition, Metaphor, and a Taxonomy

David A. Wiley, II

This oft-referenced piece is actually the first chapter of a book co-authored and edited by Wiley entitled The Instructional Use of Learning Objects. The book itself provides a substantive treatment of instructional issues affecting learning object design and delivery. In this chapter, three concerns are fleshed out:

- the confusion created by various definitions of “learning object” and the lack of attention to instructional design theory in the learning object enterprise
- a critique of the Lego metaphor and the recommendation of a new metaphor
- the construction of a neutral taxonomy to facilitate successful learning experiences

In the first section, Wiley critiques some definitions as being too broad and others as being too narrow. He hesitantly provides the following working definition for the purposes of his discussion: “any digital resource that can be reused to support learning” (p. 6). He argues that his definition avoids many of the pitfalls and confusion created by those offered by others working in this arena. Furthermore, and more importantly to Wiley, the definition highlights the “purposeful use of learning objects to support learning” (p. 7).

Next, Wiley critiques the lack of attention to instructional design theory in the design, development, and delivery of learning objects. For Wiley, it is not simply that instructional strategies and criteria for the application of learning objects must be included in the learning object discussion, but that they must play a large role. He is especially critical of the lack of discussion in the efforts of the Learning Objects Metadata (LOM) Working Group, which is associated with the Learning Technology Standards Committee. He notes that while it was stated that the goal of the group was to facilitate delivery of learning objects to learners, “no instructional design information was included in the metadata specified by the current version of the LOM Working Group” (p. 9). Wiley believes that questions about what it means for “a computer to ‘automatically and dynamically compose personalized lessons’” requires consideration of what it means to take individual learning objects and combine them in such a way that the learning objects and their sequencing make “instructional sense” (p. 9). Concerned about a possible trend that may leave out instructional design theory, Wiley argues that effective object mediated learning requires instructionally grounded sequencing decisions.

The discussion summarized to this point could be characterized as fairly negative. By the latter third of the article, Wiley offers a more positive view. Citing Richey (1986), he
notes the role of taxonomies in helping to “identify and organize the relevant variables; defining, explaining, and describing relationships among the variables” (p. 10). Citing a lack of a general learning object taxonomy compatible with multiple instruction design theories, he provides one of his own, and a table illustrating a Preliminary Taxonomy of Learning Object Types. A detailed discussion explains the chart’s content: learning object types (of which he distinguishes five) and learning object characteristics (of which he identifies eight). For Wiley, the connection between instructional design theory and learning objects is that a neutral taxonomy can facilitate meaningful learning experiences because it allows for the linking of learning objects through multiple instructional design theories. Hence, the object combination delivered to the learner will have a sense of coherence and purpose.

In the midst of his critique, Wiley provides one of the best discussions of metadata using clear illustrations. He also provides a cost-benefit analysis of granularity from both an efficiency point of view and an instructional point of view.

For the full text, see [http://reusability.org/read/chapters/wiley.doc](http://reusability.org/read/chapters/wiley.doc)

**Competency-Based Systems and the Delivery of Learning Content**

*Gena Tuso and Warren Longmire*

The authors begin this article by distinguishing competency-based models of learning from those that are knowledge-based and course-centric. Noting the benefits of competency-based models, the authors emphasize the role of learning objects in enabling “truly adaptive, competency-based learning.” The challenge, they note, is to extract learning objects from closed systems or independent systems, e.g., a proprietary course. Two hurdles regard accessing third-party content and adapting that content to fit a specific competency model and need. The authors focus most of their attention on a process model for reconfiguring “existing course content for electronic delivery on a competency-based system” (p. 34).

Four stages are noted. First, developing competency models requires that “a competency-based system define and validate appropriate competency models for desired leaning areas” (p. 35). The second stage focuses on the evaluation of content for appropriateness in deploying the defined competency-based system. Two questions that should guide evaluation of content are noted: How well does the learning material correlate with the competency model?; and does the learning material contain performance-based content? The third stage includes the creation, chunking, and tagging of learning objects derived from content areas. Questions about the size of chunks and the kinds of tags that should be attached to the objects are raised but not explored. Discussion of the last stage focuses on the need for sophisticated and relational object databases that facilitate access to objects. Here, the authors point out that accessibility will not only make it possible for instructional designers to add, delete, or edit content and tags, but that having multiple tags attached to objects will make it easier to assemble them for multiple learning purposes and electronic delivery.

In the last section of the paper, the authors look at how a knowledge-based system of content may compliment or augment competency-based learning. What it is important to
remember, they argue, is that the learning objects “should ultimately work to improve actual performance…” (p. 37).

For the full text, see http://www.learnativity.com/download/LwoL3.pdf, pages 31-38.

**How Adults Learn**

*Learnativity.com*

This useful primer contains several sections and provides a nice introduction to the theory and practice of adult learning. In the first section, a formal definition of learning and memory are provided along with physiological and neurological aspects of the learning process. The need to focus on individual learning styles and encourage life-long learning for everyone is emphasized as a must for organizations, business, and the individual who should have the conditions to “re-create” their environments and themselves. References are made to Harold D. Lasswell, Robert M. Smith, and Robert L. Stebback regarding change and human nature, becoming effective learners, and learning strategies for adult learners respectively. Additional links include references to information on learning and continuing education; a reference guide on *Theoretical Sources on Education and Learning Theory*; Thomas C. Reeve’s *The Impact of Media and Technology in Schools*; and David Jafée’s paper on “Pedagogical Principles and Practices for Asynchronous Online Learning.”

Other sections highlight the distinction between pedagogical and androgogical approaches to teaching and learning, and a variety of related topics. Historical perspectives are offered explaining older conceptions of teaching and the transition to contemporary ideas about effective learning. Five issues of androgogical learning are detailed as a way of illustrating the student-centered approach. The author warns that “postponing or suppressing [a move to student-centered learning] will slow our ability to learn new technology and gain competitive advantage.” References are made to John Dewey, Eduard Lindeman’s “The Meaning of Education,” and Knolwe’s *The Adult Learner*.

For the full text, see http://www.learnativity.com/adultlearning.html

**Experiences with Reusable E-learning Objects: From Theory to Practice**

*Jenaette M. Muzi, Tanya Heins, Roger Mundell*

In this article from the trenches of Royal Roads University and the Centre for Economic Development and Applied Research, the author provides a real-world picture of how one institution actually decided to implement and use “E-learning objects (ELOs) based on templates and using a particular course editing tool.” After noting the difficulty of defining these new learning objects, Muzio provides a brief history of how RUU and CEDAR became involved in the ELO world, pointing out that “CEDAR’s work has garnered international interest and awards.”

Many features of the article make it a good reading for a general audience. First, it is written fairly clearly and requires minimal acquaintance with the technology under discussion. Second, it provides concrete examples that illustrate the creation of ELOs
(the on-line version of the article provides links to ELOs that allow the reader to actually practice creating his or her own ELO based on CEDAR’s template and course editing tools). Third, it touches on multiple aspects of creating ELOs, i.e., areas of concern to the summit such as standards and property rights.

Muzio conveys CEDAR’s commitment to IMS standards and the need to retroactively fit metadata tags once a final standard for XML tags has emerged. The author describes how they are working to resolve issues about intellectual property rights by creating “sharable” data-bases (free-to-use materials); setting guidelines about manipulating original ELOs and preserving them; and exploring how object creators may be compensated for use of intellectual property when accessed from an external environment. The author also notes CEDAR’s concern and attention to questions about size and granularity. Pedagogically, CEDAR’s commitment to following sound instructional design in creating ELOs for quality learning outcomes is given careful treatment. Sketching the significance of instructional theory to the activities of subject matter specialists, they propose the use of Bloom’s taxonomy for the cognitive domain of creating ELOs: “This encourages developers to check that they are developing content that encompasses higher order thinking as well as merely knowing or understanding ideas and concepts.” Tools that have been used by expert skilled multimedia designers are referenced within this part of the article.

This article reflects the careful thinking of CEDAR ELO developers and concludes that a medium should be used for learning purposes because it is the best medium for that particular learning need: “Good instructional design is more important than the specific technology.”

For the full text, see [http://www.cedarlearning.com/CL/elo/eLearningObjects_sml.pdf](http://www.cedarlearning.com/CL/elo/eLearningObjects_sml.pdf)

**STANDARDS**

...the science that enables learning objects to be designed for interoperability and reusability...

**Questions for Discussion:**
- Is more work needed to solidify the standards for learning objects and learning object repositories?
- What gaps exist in current understanding or implementation of standards that must be addressed to stimulate the development of a robust learning object economy?
- How does the proliferation of standards stimulate or inhibit authorship of learning objects?
- What is the most important development needed in the area of standards?

*Researcher’s Notes: Information on standards was fairly easy to locate, and most of the documents summarized in the overview section refer to the role of standards. The documents in this section are listed here because they focus precisely on standards. A great deal of literature was found that centered on the computing and engineering*
aspects of interoperability; those articles are not included here as they were deemed overly technical for the purpose of this document.

Making Sense of Learning Specification & Standards: A Decision Maker’s Guide to Their Adoption

The Masie Center

This white paper, facilitated by the S3 Working Group of the e-Learning Consortium, was created “to help the average person understand the rationale, development, and implication of learning standards and to accelerate their adoption.” The first part of the paper serves as a primer for those who have little to no knowledge of learning standards.

The author points out that calls for interoperability between proprietary technology applications are often the result of frustration experienced by users wishing to maximize time, intellectual, and monetary investments in learning technologies. As with other historical technologies and tools, various sectors come together to create a set of standards. In so far as learning objects are concerned, then, the goal is to create an infrastructure whereby objects can be created, used, transferred, and reused across different application systems and platforms. Standards help to ensure e-learning effectiveness and resource investments by promoting the following goals: interoperability, re-usability, manageability, accessibility, and durability (each of these “abilities” is fleshed out in the text).

The core of the paper focuses on a holistic but detailed explanation of how standards are formed. The roles of special consortia (AICC, IMS, and ARIADNE), labs, test beds, and markets (e.g., ADL and ALIC), and standards bodies (IEE, ISO, and CEN/ISSS) in creating de facto standards are well illustrated by a graphic illustration. Discussion includes initiatives underway in Japan, Europe, and Australia. The author is careful to point out that counter to some perceptions, “the different organizations and groups … are not in any conflict or competition with each other” because each has a special but crucial function in the development of standards (p. 10).

The US Department of Defense’s Sharable Content Object Reference Model (SCORM) is also discussed. SCORM’s function is related to the infrastructure illustrated by the model of standards evolution: “SCORM provides a foundational [detailed] reference model upon which anyone can develop models of learning content and delivery.” SCORM’s role in enabling content, technology, and systems to “talk” to each other is related to the five goals of standards initiatives mentioned at the beginning of this summary. That SCORM is not a standard itself but a mode by which to test the “effectiveness and real-life application of a collection of individual specifications and standards” is emphasized.

Appendix 1 of the Masie Institute document clarifies the distinction between compliance and conformance, and it introduces the terms certification and product self-test. Appendix 2 discusses the importance of implementing meta-data, and it discusses the terms categorization and taxonomy. Appendix 3 focuses on learning objects. Autodesk’s content model is used as an illustration, and includes a depiction of the relationship between raw content items, information objects, learning objects, lessons, and courses. Included is also a brief explanation of SCO and SCORM. Appendix 4 focuses on
standards and specifications groups. Brief descriptions of thirteen initiatives and projects are given. Efforts in Europe, Australia, and Japan are included in the discussion as well.

For the full text, see http://www.masie.com/standards/S3_Guide.pdf

**Learning Objects and Learning Standards: Everything You Ever Wanted to Know but Were Afraid to Ask**

*Wayne Hodgins*

In this paper, Hodgins first describes the need for standards as they are related to maximizing learning technologies, then he raises several key questions driving standardization projects:

- How will we mix and match content from multiple sources?
- How do we develop interchangeable content that can be reused, assembled, and disassembled quickly and easily?
- How do we ensure that we are not trapped by a vendor’s proprietary learning technology?
- How do we ensure that your learning technology investments are wise and risk adverse?

Most of the paper is comprised of brief descriptions of those involved with standards initiatives: IEEE Learning Technology Committee, Advanced Distributed Learning (ADL), International Management System (IMS), AICC: The Aviation Industry CBT, PROMETEUS, and the Dublin Core: Metadata for Electronic Resources. Hodgins concludes the paper by emphasizing that an official set of standards is well on its way, and advises savvy, strategic-minded individuals and organizations to familiarize themselves with the “techno-mumbo-jumbo.” An action plan is provided.

This is a very accessible paper that focuses on a general explanation of the concepts. A brief explanation is provided about the connection between content objects, meta-data repositories, and discoverability.

For the full text, see http://www.learnativity.com/standards.html

**Learning Technology Standards: An Overview**

*CETIS (Center for Technology Interoperability Standards)*

This document discusses the need to develop standards from the standpoint of education. It is suggested that developing standards will result in the following:

- free educational systems from barriers encountered with finding and incorporating content in learning environments
- make moving between institutions easier for students
- aid technology consultants or specialists in supporting the teachers and staff who use content for teaching and administrative purposes
The article points out not only the diverse ways interoperability will affect the creation of learning objects but also the way they are packaged and sequenced. Implications for transferability between platforms and environments are also noted. This document also emphasizes the need for administrative systems to work with one another to achieve goals of standardization. The tension between suppliers’ preferences and users’ preferences is noted, and the fact is pointed out that suppliers prefer to have as little standards as possible because they represent both implementation and protection costs, while users want a broad and well-defined set of standards for flexibility and choice.

A very brief but interesting history of IMS explains how an interest in standards became popular and organized. Related bodies and user-led bodies are referenced but no descriptions are given. This is a very short, introductory article to standards. What it lacks in detail it makes up in clarity.

For the full text, see http://www.cetis.ac.uk/static/standards.html

TOOLS

...software and techniques used to create effective learning objects...

Questions for Discussion:

- What are the obstacles toolmakers face in incorporating LO standards into their software?
- What gaps exist in the kinds of tools currently available to authors of learning objects?
- What kinds of tools are needed to support a robust learning object economy?
- What is the most important capability or functionality needed as toolmakers create new tools for the design and development of learning objects and repositories?

Researcher’s Notes:  The literature on tools for the development of learning objects and learning object repositories overlaps a great deal with that of standards and pedagogy. The following articles were selected for inclusion here because their focus was more directly on the creation of learning objects.

A Primer on Learning Objects
Warren Longmire

In this paper, excerpted from Informania's Learning Without Limits, Volume 3, Longmire discusses some of the challenges and opportunities faced by developers of “object-based” learning content. The opportunities listed center around the idea that adding layers or capability to learning objects adds value to them because they can be reused and thus provide a higher return on investment. He provides short explanations of how flexibility, ease of updates, searches, and contents, customization, and interoperability, and facilitation of competency-based learning add value to learning objects when industry wide-standards are implemented and adopted. Pointing out the link between object content and meta-data tags, he notes that the “most desirable tools [for authoring and meta-tagging] will permit scalable contextualization so that learners can control the
extent to which the context is presented with context” (p. 3). After citing a list of an "RLO’s” (Reusable Learning Object) ideal attributes, he comments on related challenges and opportunities.

The last part of the paper looks at the creation of “context.” Recognizing the need for some context to avoid confusion, error, and complete loss of meaning, Longmire asks how context can be scalable in expanse and type, so that the learner can decide how much is needed. Pointing to constructivist theories about individual meaning-making, he provides a sketch of some approaches content developers might adopt: tailored wrappers, tailored context frames, adding context links to objects, and pattern templates. He concludes by observing the need to combine “thoughtful planning with intelligent deployment of advanced authoring tools…”

For the full text, see http://www.learningcircuits.com/mar2000/primer.html

**A Component Repository for Learning Objects: A Progress Report**

*Jean R. Laleuf and Anne Morgan Spalter*

This article may be thought of as a case study related to the mechanics and process of developing quality content objects. Laleuf and Spalter voice concerns about the complexity and challenges of creating comprehensive, quality object repositories. They stress the importance of collaboration and raise the following questions:

- How does one analyze current simulations for decomposition into reusable components?
- How can one design components to be useful for educators (as well as programmers)?
- How does one choose a proper level of granularity?

In examining these questions, the authors highlight previous work and challenges regarding programs, tools, and techniques. Special attention is given to component categorization strategy, support technologies, application technologies, and granularity strategy. The authors present a case study involving “a set of applets that teach students in an introductory graphics course about 3D camera transformations” (p. 35). Reference is made to text illustrations, in-class models, and customized software. The authors proceed to discuss how a minimally successful content object was enhanced by engaging in a formal design process linking pedagogical considerations to component design. This section of the article ends with a discussion of reusability outcomes and future work to be done on developing like content objects for the science and mathematics repository they envision. Special attention is given to the need for work on molecular visualization applets; increasing compatibility efforts; and metadata standards for harvesting.

The authors conclude on a hopeful note about the development of quality content objects and repositories but point to challenges an object-based approach to content development presents to designers, programmers, and institutional resources. As programs, applications, and tools are refined through application by and feedback from content creators (and vice versa), the authors are hopeful that the extra time and resources spent will prove most beneficial.
Creating Learning Objects With Macromedia Flash MX

Tanya Heins & Frances Himes

Heins and Himes begin this whitepaper by noting the challenge of finding authoring tools to develop standards-based, on-line content that can be reused in multiple contexts; that is high in quality; and that is transferable across various platforms and devices. While it is technically possible to develop, design, deploy, and transfer content, the authors feel that a new paradigm must be adopted—one that shifts content design from the “traditional linear ‘course’ approach to a more granular, component approach” (p. 1).

Noting the Masie Center’s work in clarifying standards, the authors describe an “anatomy” of learning object design and development. A graphic illustration highlights the connection of learning, practice, and assessment to a learning objective; it also indicates the role of metadata and the significance of interoperability with management systems and databases. Citing the need to “draw upon shared templates and development methodologies, code resources, and media assets,” the authors note the need for powerful and flexible development tools. This need is linked to the quality, utility, and value of content objects.

Macromedia Flash and Macromedia Flash MX are provided as examples of tools that can address this need. Topics covered in this section of the paper include rapid development environments, libraries, movie clips, components, action scripts, and bandwidth. Reference is also made to HTML publishing, JavaScript, and SCORM-compatible LMS products. The dynamic instructional potential of content is strongly emphasized as a benefit of using Macromedia Flash MX.

After providing a list of questions that should be asked before embarking on the development of a learning object, the second half of the paper discusses the process of developing and distributing learning objects from a systems point of view. The authors interweave discussion, graphics, and a hypothetical case study to point out the following key stages: pre-assessment; analysis and design; development; learning interactions; implementation and evaluation; and maintenance.

Hines and Himes conclude with a further but unexamined list of the possibilities an authoring tool such as Macromedia Flash MX holds. It should be noted, however, that a basic familiarity with programming or software applications may be helpful to understanding the more technical portion of the paper.

For the full text, see:

PART III
APPENDICES

GUIDE TO SELECTED ORGANIZATIONS
The listing that follows gives official descriptions of the organizations mentioned in this report. In most cases, the text provided here has been drawn verbatim from the various organizations’ websites.

Advanced Distributed Learning Initiative (ADL): The Advanced Distributed Learning Initiative is a collaborative effort between government, industry and academia to establish a new distributed learning environment that permits the interoperability of learning tools and course content on a global scale. Sponsored by the U.S. Department of Defense (DoD) in coordination with the White House Office of Science and Technology Policy (OSTP), ADL’s vision is to provide access to the highest quality education and training, tailored to individual needs, delivered cost-effectively anywhere, anytime. See http://www.adlnet.org.

AICC: The Aviation Industry CBT (Computer-Based Training) Committee (AICC) is an international association of technology-based training professionals. The AICC develops guidelines for aviation industry in the development, delivery, and evaluation of CBT and related training technologies. The objectives of the AICC are as follows:

- Assist airplane operators in development of guidelines which promote the economic and effective implementation of computer-based training (CBT).
- Develop guidelines to enable interoperability.
- Provide an open forum for the discussion of CBT (and other) training technologies.

The AICC wants the aviation training community to get the best possible value for its technology-based training dollar. The only way that this is possible is to promote interoperability standards that software vendors can use across multiple industries. With such standards a vendor can sell their products to a broader market for a lower unit cost. AICC recommendations are fairly general to most types of computer based training and, for this reason, are widely used outside of the aviation training industry. The AICC also actively coordinates its efforts with broader learning technology standards organizations like IMS, ADL, and IEEE/LTSC. See http://www.aicc.org/pages/aicc_faq.htm

Educational Object Economy Foundation (EOE): The Educational Object Economy Foundation investigates the growth and propagation of online learning communities, via the development of component-based tools for the creation and sharing of learning objects.

Founded by Dr. James Spohrer as part of a National Science Foundation-funded project, hosted by Apple Computer, and including industry, university, and
government collaborators, the EOE develops and distributes tools to enable the formation of communities engaged in building shared knowledge bases of learning materials. Today, EOE tools and content have been used by thousands of people around the world. See http://www.eoe.org.

**IMS Global Learning Consortium:** The IMS Global Learning Consortium, headquartered in Burlington, Massachusetts, is a specification authoring organization, with its membership drawn from distributed computer learning system vendors, publishers, digital content vendors, government agencies, universities, schools, training organizations, and other interested parties. IMS specifications are intended to evolve into globally adopted open standards for Learning Management System (LMS) vendors and content authors. All IMS specifications are made available to the public without charge and are realized in eXtensible Markup Language (XML), to facilitate unrestricted understanding and adoption.

One of IMS' central objectives is to facilitate working relationships among LMS vendors, content authors, and learners to foster a mutually beneficial and thriving marketplace around open Internet standards.

See http://www imsproject org/imsdr whitepaper_v1p6.html#1225538

**Learning Technology Standards Committee (LTSC):** The Learning Technology Standards Committee (LTSC) is chartered by the IEEE Computer Society Standards Activity Board to develop accredited technical standards, recommended practices and guides for learning technology. The LTSC coordinates formally and informally with other organizations that produce specifications and standards for similar purposes. Standards development is done in working groups via a combination of face-to-face meetings, teleconferences, and exchanges on discussion groups.

The LTSC is governed by an executive committee consisting of working group chairs and elected officers. The IEEE promotes the engineering process of creating, developing, integrating, sharing, and applying knowledge about electro and information technologies and sciences for the benefit of humanity and the profession. For additional information, see the web sites at http://ltsc.ieee.org/ and http://www.ieee.org/organizations/corporate/vision.htm

**Learnativity.com.** Learnativity is an idea, a practice, and a bringing-together of concepts important to most everyone wanting to succeed in the new century. Learnativity.com is an organization created by Marcia Conner and Wayne Hodgins to convey these concepts beyond Learnativity.com and to help foster an alliance for the new learning economy. The Learnativity website is a rich treasure trove of materials related to these concepts and ideas. See http://www.learnativity.com/about.html

**Macromedia Inc.** Macromedia Inc. provides software that empowers millions of developers and designers to efficiently create the most effective user experiences on the Internet. Its integrated family of tool, server, and client technologies enables the delivery of a wide range of Internet solutions from websites to Rich Internet Applications across platforms and devices.
With an installed base of three million developers and designers, rich client software deployed to 98 percent of web users, and a broad network of industry partners, Macromedia is a strategic IT supplier to customers in the business, government and education markets. The company has operations in more than 50 countries worldwide, and headquarters in San Francisco, California. See http://www.macromedia.com/macromedia/

The MASIE Center. The MASIE Center is an international e-lab and ThinkTank located in Saratoga Springs, NY. The Center is dedicated to exploring the intersection of learning and technology. The Center focuses on these key areas:

- How will people and organizations leverage technology as a tool for learning, knowledge and performance?
- What are the best practices for implementing e-Learning and other models of digital collaboration?
- How do people REALLY learn? And, what are the behavioral and cultural assumptions behind learning?
- How does learning change around the globe?
- How do organizations absorb technology into their culture?
- What makes technology work from a behavioral point of view?

The MASIE Center provides its services to major corporations and technology providers throughout the world. The Center provides research, perspectives, training, learning products and consulting on these key issues. The MASIE Center was formed to provide a clear-thinking leadership hub for the next generation of learning and technology solutions.


The New Media Consortium. The New Media Consortium (Formerly New Media Centers) is a non-profit organization that brings forward-thinking colleges and universities together with innovative high-tech companies to explore new ways of teaching and learning through new media. Founded in 1993, NMC has grown to include 115 educational institutions, connecting them to the resources they need to develop new media centers in their libraries, computing centers, and various academic departments. With the help of corporate members, these centers give faculty and students alike access to the immense potential of new media. As a result, NMC members are able to devise and demonstrate solutions and technologies that can be used in a wide variety of educational settings. NMC also provides a variety of members-only forums in which pedagogical, legal, and technological issues in new media are explored. See http://www.newmediacenters.org/about/mission.html

University for Industry (Ufi). Ufi is one of the UK government's key partners in delivering the workforce development and lifelong learning agenda. Ufi is bringing about a revolution in learning by taking forward the government's concept of a 'university for industry.' learndirect is Ufi's nation-wide network of online learning
and information services. Ufi aims to drive up demand for learning, help adults improve their employability by acquiring new knowledge and skills, and help businesses become more competitive. It is using Information Communications Technology, (ICT) to revolutionize where and how people and businesses learn. It is developing learning materials which allow people and businesses to learn in 'bite-sized chunks' on line through the Internet at a pace and at times that suit them and wherever they have access to the Internet - at learning centers, at home or at work.

See: http://www.ufiltd.co.uk

EXAMPLES OF LARGE SCALE INITIATIVES & PROJECTS

The listing that follows gives official descriptions of a number of important initiatives and projects. In most cases, the text provided here has been drawn verbatim from the official websites.

AUSTRALIA

COLIS: The COLIS Consortium is an alliance of five universities, namely, Macquarie University (lead institution), University of Newcastle, University of New England, University of Southern Queensland, and University of Tasmania. The initial project is funded by DETYA, as part of the education technical standards interoperability agenda. The goals of COLIS are:

1.1 To share knowledge and expertise in developing the functional and technical architectures necessary for institutional systems interoperability.
1.2 To engage in national and international research programs aimed at developing systems interoperability.
1.3 To share systems development where appropriate.
1.4 To share the purchase of commercial systems components, where appropriate.
1.5 To develop strategic alliances with other universities and with industry partners to further the interests of the COLIS agenda.

For additional information, see http://www.colis.mq.edu.au/

EdNA: The EdNA collaboration (Education Network Australia) is pursuing a range of activities on technical standards to support effective use of information and communications technology in education and training. The AICTEC has established a Standards Sub-Committee to coordinate these activities.

The charge to the Standards Sub-Committee is to:

- Develop and maintain a strategically focussed approach to technical standards in support of effective use of information and communications technology (ICT) in education and training;
• Draw together existing work on ICT-related standards in education and training, thereby avoiding duplication, fragmentation and inconsistency in current and future work;
• Work with other bodies as appropriate, to develop, implement and promote specific technical standards to support the effective use of ICT including in all action areas identified in the Education and Training Action Plan for the Information Economy;
• Provide expert advice to AICTEC (and through AICTEC, to MCEETYA) on the development and implementation of national standards to facilitate interoperability, at the ICT level, of education, resource access and usage;
• Ensure that it is seen by education and training stakeholders as being representative of their interests, and that all relevant expertise and stakeholder interests are considered in regard to particular matters as they arise;
• Build coherent linkages with standards efforts in other areas of the Australian community and internationally, working closely with Standards Australia.

For additional information on EdNA, see [http://www.edna.edu.au/](http://www.edna.edu.au/)
For the standards’ project, see: [http://standards.edna.edu.au/committee.html](http://standards.edna.edu.au/committee.html)

**ICT-Based Learning Designs:** Funded by the [Australian Universities Teaching Committee](http://www.australianuniversitysteachingcommittee.org/auutc/) (AUUTC), the aim of this two-year project is to maximize opportunities for university teachers to create engaging learning opportunities for students within high-quality, flexible learning environments. This is to be achieved by conducting the following:

- identifying a range of learning designs that have been demonstrated to contribute to high quality learning experiences in higher education and which can be applied in other contexts;
- selecting those which are suitable for development as re-usable software, templates, exemplars and/or frameworks;
- undertaking their necessary development; and
- developing a series of guidelines for good practice in the use of the software, templates, exemplars and/or frameworks in new contexts.


**Le@rning Federation:** The Le@rning Federation, currently the largest learning object project in Australia, is an initiative of the state and federal governments of Australia and New Zealand. Over the period 2001-2006, the Initiative aims to develop online interactive curriculum content specifically for Australian and New Zealand schools. The Initiative will support teachers in enhancing student learning thereby greatly improving educational outcomes for students.

The project is developing systems which will allow the input and delivery of high quality curriculum online by a range of approved content developers to an agreed set of specifications. The systems will also facilitate the breakdown of content into
discrete 'objects' and the reassembly and repurposing of these to suit the particular needs of teachers and students.

For additional information, see http://socci.edna.edu.au/

CANADA
Canada has a great many projects that could be listed here, a large proportion funded under the aegis of CANARIE. A few are listed here as examples.

CANARIE: Canada's advanced Internet development organization (CANARIE) is a not-for-profit corporation supported by its members, project partners and the Federal Government. CANARIE's mission is to accelerate Canada's advanced Internet development and use by facilitating the widespread adoption of faster, more efficient networks and by enabling the next generation of advanced products, applications and services to run on them.

Headquartered in Ottawa, Ontario, CANARIE employs 29 full-time staff dedicated to the research and implementation of advanced networks and applications that will stimulate economic growth and increase Canada's international competitiveness. CANARIE has already succeeded in enhancing Canadian R&D Internet speeds by a factor of almost one million since its inception in 1993. The organization has also funded numerous advanced Internet applications projects, providing some 500 companies with the opportunity to achieve business success through innovation.

CANARIE acts as a catalyst and partner with governments, industry and the research community to increase overall IT awareness, ensure continuing promotion of Canadian technological excellence and ultimately, foster long-term productivity and improvement of living standards. For more information, see http://www.canarie.ca/about/about.html.

BELLE: Over the course of two years, the Broadband Enabled Lifelong Learning Environment (BELLE) is exploring a number of critical aspects of building object repositories. Specifically, BELLE is investigating four interconnected aspects of establishing this repository.

1. Creating and Cataloguing Educational Objects  BELLE is cooperating with other Learning Program projects to develop the "Canadian Core", a set of standards to describe the content of educational objects so that the repositories can be effectively searched. This standard, or protocol, is called metadata. In cooperation with the Learning Commons at the University of Calgary, BELLE is creating tools and methods for automatically generating metadata and optimizing the digital content creation and repurposing process.

2. Pedagogical Models and Peer Review  Tim Buell at the University of Calgary is leading the investigation into the pedagogical approaches that are required to
establish peer reviewing and quality assessment of educational objects. This is designed to give academic merit to the production of educational learning objects.

3. Evaluation and Support Under the direction of Terry Anderson of the University of Alberta, BELLE is developing a comprehensive set of evaluation tools to assess the value and impact of its components. Netera is also developing a comprehensive structure for the support and dissemination of information about the project. This includes demonstrations, presentations, articles, and support via telephone and email.

4. Testbed Infrastructure Finally, Netera Alliance is working with all its partners to establish a testbed infrastructure of Client Learning Environments, servers and Content Repurposing Facilities. Client Learning Environments are mobile workstations that turn any classroom with a broadband connection into a distance learning centre with H.323 video conferencing, application sharing and multimedia content. Content is served from a variety of servers from companies such as SGI, Callisto and Apple. Content Repurposing Facilities are used to digitize and tag content.

BELLE has been asked to share this work with other Learning Program projects through a subcommittee that is investigating the technical requirements of object repositories. The aim of BELLE is to weave these four areas together to make a prototype for an educational object repository. While this prototype will not be a fully functional or complete repository, it is intended to test, evaluate and document the key components of such a structure. See http://belle.netera.ca.

CAREO: The Campus Alberta Repository of Educational Objects (CAREO) is a related project supported by Alberta Learning that will create a searchable, web-based collection of multidisciplinary teaching materials for educators across the province. CAREO is being undertaken jointly by the Universities of Alberta and Calgary in cooperation with BELLE, CANARIE, and as a part of the Campus Alberta initiative. See http://www.careo.org for additional information.

LearnCanada: LearnCanada's mission is to leverage the potential of CA*net 3 (CANARIE's national optical R&D Internet), to develop a broadband interactive virtual learning community for Canadian K-12 educators. With access to advanced networks and tools, members of the community will be able to collaborate in developing the requisite pedagogical expertise, which, will ultimately foster an innovative learning culture that will sustain and enhance Canada's position within the global knowledge economy.

LearnCanada will achieve these goals through the development of multimedia tools and middleware that facilitate professional development through virtual peer-learning communities and telementoring, using a broadband infrastructure. See http://www.learncanada.ca/ for additional information.
POOL: The Portal for Online Objects in Learning (POOL) Project is a consortium of several educational, private and public, sector organizations to develop an infrastructure for learning object repositories. The consortium addresses the issues of building such architectures including the metadata, software and hardware considerations and bootstrapping the system with initial content. POOL also makes its tools available for download, to help set up similar infrastructures elsewhere and to connect them to POOL. The main advantage of their solution, according to the website, is that it can potentially embrace all nature of individuals and organizations involved in the learning object economy. See http://www.edusplash.net

EUROPEAN UNION

PROMETEUS: The objectives of the Promoting Multimedia Access to Education and Training in European Society effort (PROMETEUS) are:

- to improve the effectiveness of the co-operation between education and training authorities and establishments, users of learning technologies, service and content providers and producers within the European Community including the Commission of the European Communities (the Commission),
- to foster the development of common European and international standards for digital multimedia learning content and services,
- to give a global dimension to their co-operation, and to having open and effective dialogues on issues relating to learning technologies policy with policy makers in other regions of the world, while upholding Europe's cultural interests and specificities,
- to consider that the way to achieve these goals is by following certain common guidelines organizing their future co-operation,
- to consider that these guidelines should be based upon an analysis of the needs expressed by users of the information and communication technologies (ICT) in the education and training sector"

For a comprehensive description, see http://www.prometeus.org/index.cfm

HOLLAND

OUNL/EML: The work carried out by the Open University of the Netherlands (OUNL) on educational modeling comes from an R&D project funded by the Dutch national government through their structural funds for universities. The R&D work on learning technologies is paid from these funds with the objective of innovating education through the use of ICT.

OUNL research is academic and independent of any vendor or other commercial stakeholder. Besides work on Educational Modeling Language (EML), the OUNL’s research and development activities in learning technologies include: competency
based learning, new models of assessment (e.g. portfolio’s), printing on demand, and others. The main outputs are: specifications, prototypes and publications.

The EML website notes that to date no comprehensive notational system exists that allows one to codify units of study (e.g. courses, course components and study programmes), in an integral fashion. EML is the first system to achieve precisely this. EML describes not just the content of a unit of study (texts, tasks, tests, assignments) but also the roles, relations, interactions and activities of students and teachers. The major EML implementation is in XML (eXtensible Mark-up Language), an internationally accepted meta-language for the structured description of documents and data.

Various kinds of specifications with which educational content may be codified are under development. Examples are initiatives taken by IMS, IEEE-LTSC, Dublin Core and ADL-SCORM. EML does not make these initiatives superfluous, nor does it run contrary to their aims. If anything, it takes many of the ideas voiced by them one step further by developing a more comprehensive notational system. For additional information, see the EML site at http://eml.ou.nl/introduction/explanation.htm.

UNITED KINGDOM

CETIS: The Center for Educational Technology Interoperability Standards (CETIS) is a national effort that:

- represents UK Higher and Further Education on international educational standards initiatives
- advises Universities and Colleges on the strategic, technical and pedagogic implications of educational technology standards, including the Further Education Managed Learning Environment Programme
- manages UK Implementation groups examining IMS specifications
- disseminates information on learning technology standards

CETIS is managed by CeLT at the University of Wales Bangor in partnership with the Open University. See http://www.cetis.ac.uk/static/about.htm

SoURCE: This project aims to explore customization as a technique for increasing the extent to which educational software is used and re-used appropriately in higher education. It is also focusing on dissemination by investigating the feasibility of setting up a "National Library of Re-usable Educational Software" (RESL). A key element of the RESL strand is looking at metadata and interoperability issues. The prototype library was based on the EOE’s Generic Object Economy architecture.

For additional information, see http://www.source.ac.uk/
**University for Industry:** In its Green Paper, *The Learning Age*, the UK government set out its vision of “a learning society in which everyone, from whatever background, routinely expects to learn and upgrade their skills throughout life.” Backed by the UK government, the University for Industry (Ufi) was created to make that vision possible. With ambitious plans to bring learning and skills into people's lives, Ufi developed the *learndirect* service to change the face of learning for hundreds of thousands of people across the UK.

There are, as of January 2002, 1,763 *learndirect* e-learning learning centers across the country. The majority of these e-learning centers are operated by local and national organizations known as Ufi hubs. Over 600 organizations are working in partnership with Ufi as part of local, employer and sector-based hubs. Partners involved with Ufi hubs and operating *learndirect* centers are typically employers, business organizations, colleges, universities and private training providers, Learning and Skills Councils, local authorities, libraries, trades unions, and sports and community organizations.

Many *learndirect* courses are eligible for public funding from the FE and HE funding bodies, which means that the e-learning opportunities being opened up through *learndirect* are affordable as well as accessible. The Learning and Skills Council designated £145.5 million for the financial year 2002-03 to support *learndirect* learners in England. In Wales, approximately £1.7 million has been designated to support *learndirect* learning in the financial year 2002-03. The Department for Employment and Learning in Northern Ireland has made up to £2.8 million available to support *learndirect* learning in Northern Ireland in the same period.

Ufi commissions its *learndirect* learning materials from Ufi qualified suppliers, which include organizations such as IBM, BBC, and Microsoft as well as colleges, universities and professional institutes. Ufi's suppliers are producers of high-quality open and distance learning materials, ranging from web, digital and multimedia products through to video, audio and traditional print.

See: [http://www.learndirect.co.uk/](http://www.learndirect.co.uk/)

**The Union Learning Fund:** The Union Learning Fund (ULF) promotes activity by trade unions in support of the government's objective of creating a learning society, by influencing the increase in take up of learning in the workplace and boosting union's capacity as learning organizations.

2001/2 was the ULFs fourth year and 107 projects commenced. To date the ULF has supported 311 projects from over 66 unions, working in almost 3,000 workplaces. The projects have ranged from basic skills to continuing professional development. Several ULF projects have been held as examples of good practice - two projects were included in the European Social Partners Compendium of Best Practice, one project won a NIACE (National Institute of Adult Continuing Education) award and one project won an award at Birmingham's *Learning City in Europe 2001* event.
Union Learning Fund monies are used to open workplace learning centers, train Union Learning Representatives, run courses, and help people find learning opportunities to suit them.

See: http://www.dfes.gov.uk/ulf/

UNITED STATES
The US has a great many projects that could be listed here. The ones listed here are only illustrative of the work taking place and the list is not comprehensive.

Advanced Distributed Learning Co-Labs: The Advanced Distributed Learning (ADL) initiative created a network of three ADL Co-Laboratories (ADL Co-Labs), a hub and two functionally defined nodes, to advance the initiative and to serve distinct areas of operational responsibility. The ADL Co-Lab Network serves as the focal point and catalyst for the large-scale cooperative research, development, implementation and assessment of ADL technologies and related products.

The Alexandria ADL Co-Lab is the operational command post of the ADL Initiative and coordinates communication across the ADL Co-Lab Network. The Joint ADL Co-Lab was established to promote collaborative development of ADL prototypes and ADL systems acquisitions, primarily among the Department of Defense components. The Academic ADL Co-Lab serves as an academic partner and ADL link to test, evaluate and demonstrate ADL-compliant tools and technologies to enhance teaching and learning.

The ADL Co-Labs are the principal elements of the ADL Initiative's cooperative effort between DoD activities, other federal agencies, international organizations, academia, the private sector and international standards organizations. The ADL Co-Labs provide open collegial forums whose focus is the collaborative development of the advanced distributed learning environment that will enable interoperability and reuse of tools and learning content on a global scale. The ADL Initiative focuses on the transformation of military education and training by providing high-quality instruction and decision support that can be tailored to individual needs and provided anywhere and anytime it is needed. The ADL Co-Labs are helping to establish the structure for the new global e-learning environment.

For additional information, see http://www.adlnet.org/index.cfm?fuseaction=colabovr&cfid=67313&cftoken=32804210

MERLOT: MERLOT [Multimedia Educational Resource for Learning and Online Teaching] is a free and open resource designed primarily for faculty and students of higher education. Links to online learning materials are collected here along with annotations such as peer reviews and assignments.

MERLOT is also a community of people who are involved in education. Community members help MERLOT grow by contributing materials and adding assignments and
comments. It is recognized that the scope of coordination activities and the requirements for sustaining MERLOT is rapidly increasing and a new, neutral coordinating organization needs to be established. To that end, MERLOT is advancing the current collaborative framework, exploring a variety of business models, and developing its sustainability plan so MERLOT can serve the current and future academic technology needs of faculty, students, staff, and institutions. See the MERLOT website at http://taste.merlot.org/history/history.html

**Open Knowledge Initiative (OKI):** The primary goal of the Open Knowledge Initiative (OKI) is to design and develop an open and extensible architecture for learning management systems (LMS). From this foundation, it is hoped that OKI will become a community, a process, and an evolving open source toolset. The realization of this primary objective, however, will help us and other contributors to achieve the rest. The Mellon Foundation has funded the first two years of what is expected to be an ongoing effort. MIT leads the project in close collaboration with Stanford. A number of key partner institutions are also playing important roles in defining the OKI architecture.

OKI's architecture and open source approach is designed to encourage both partner institutions and eventually a broader educational community to contribute tools and services to OKI's code-base. OKI is being designed to be spare and elegant and yet provide the hooks and services that will make it a fertile environment for academic developers.

Another goal of OKI is to promote use of this architecture in the development of pedagogical applications (often refer to as "tools" in OKI literature and discussions) that facilitate, among other things, the management of learning content.


**NSDL/SMET/Digital Libraries Initiative (DLI) Phase I and Phase II:** The National Science, Mathematics, Engineering, and Technology in Education Digital Library program was established by the National Science Foundation. The NSDL program solicitation notes that the

“… NSDL program will foster the creation and development of a comprehensive infrastructure, including an integrated management structure for the digital library, standards for quality control and intellectual property management of resources, and policies and practices for the guaranteed stability and archiving of materials and products. It is expected that the library established by the NSDL program will enable the dynamic use of materials and tools for learning supplied by cooperating providers of resource collections and services. For example, a case study at one site of how climate-change scientists employ satellite imagery to determine surface water chemistry could be combined with computational and visualization tools from another collection, and used to analyze and display archived data housed in yet another collection. In addition, services available
through the library will increase the accessibility and impact of all resources, by supporting effective search and discovery of content, flexible assembly of curricular and learning modules from component pieces, and communication and collaboration among users.

This program builds on previously and currently funded work supported under the multi-agency Digital Libraries Initiative (DLI) Phase I and Phase II (see [http://www.dli2.nsf.gov/](http://www.dli2.nsf.gov/)), and is intended to multiply the impact of efforts supported by NSF, other government agencies, the private sector, professional societies, and others working to improve SMET [Science, Mathematics, and Technology Education] education nationwide.”


**OpenCourseWare Initiative:** The idea behind the MIT OpenCourseWare (MIT OCW) is to make MIT course materials that are used in the teaching of almost all undergraduate and graduate subjects available on the web, free of charge, to any user anywhere in the world. MIT OCW will radically alter technology-enhanced education at MIT, and will serve as a model for university dissemination of knowledge in the Internet age. Such a venture will continue the tradition at MIT and in American higher education of open dissemination of educational materials, philosophy, and modes of thought, and will help lead to fundamental changes in the way colleges and universities engage the web as a vehicle for education. See [http://web.mit.edu/ocw/ocwfactsheet.html](http://web.mit.edu/ocw/ocwfactsheet.html)

**SCORM:** The Sharable Content Object Reference Model (SCORM), a project of the Advanced Distributed Learning Initiative (ADL), defines a Web-based learning "Content Aggregation Model" and "Run-Time Environment" for learning objects. At its simplest, it is a reference model that references a set of interrelated technical specifications and guidelines designed to meet DoD's high level requirements for Web-based learning content. These requirements include, but are not limited to, reusability, accessibility, durability and interoperability. The work of the ADL Initiative to develop the SCORM is also a process to knit together disparate groups and interests. The SCORM aims to bridge emerging technologies and commercial and public implementations.

SELECTED FUNDING AND DEVELOPMENT LINKS

Australia

Canada
CANARIE
Funding Programs
  http://www.canarie.ca.funding/funding.html
  http://www.canarie.ca/about/quick-reference.html

European Union
eLearning Initiative
  Actions and programs

United Kingdom
British Education Communications Technology Agency (BECTa)
  http://www.becta.org.uk

Department for Education and Skills (DES)
  http://www.ufiltld.co.uk/press/facts/default.asp

Joint Information Systems Committee (JISC)
  http://www.jisc.ac.uk/
  Current Strategic Issues
  http://www.jisc.ac.uk/curriss/index.html
  Opportunities for Funding/Funding for Projects
  http://www.jisc.ac.uk/general/proj_funding.html

Learning Skills and Development Agency (LDSA)
  http://www.ldsa.org.uk/home.asp

United States
US Department of Commerce
  http://www.commerce.gov/

National Institute of Standards and Technology
  http://www.nist.gov/
Advanced Technology Program (ATP)
  http://www.atp.nist.gov/atp/
US Department of Commerce (continued)

Technology Opportunities Program (TOP)
http://www.ntia.doc.gov/top/index.html

US Department of Education
http://www.ed.gov/

FIPSE
http://www.ed.gov/offices/OPE/FIPSE/welcome.htm
LAAP
http://www.ed.gov/offices/OPE/FIPSE/LAAP/overview.html

National Science Foundation (NSF)
Overview of Grants and Awards
E-LEARNING AND LEARNING OBJECTS


**POLICY**


Digital Millennium Copyright Act of 1998, H.R. 2281. Available via the Copyright Office website page on Copyright and Distance Education: http://www.loc.gov/copyright/disted/


U.S. Copyright Office, (May 1999). *Report on Copyright and Digital Distance Education*. Available at Available via the Copyright Office website page on Copyright and Distance Education: http://www.loc.gov/copyright/disted/ [See article for reference of pertinent documents in Appendix of Report]


**FUNDING**

*Note: URLs for funding agencies and descriptions of programs are provided in the text and summarized in the Appendices.*


EFFECTIVENESS


PEDAGOGY/ANDROGOGY


Learnativity.com. How adults learn [some of the text is drawn from a Wave Technologies white paper cited below]. Available at http://www.learnativity.com


Wiley, D. A. (2000). Connecting learning objects to instructional design theory: A definition, a metaphor, and a taxonomy. In D. Wiley (Ed.), The Instructional Use of Learning Objects. Available at http://reusability.org/read/ [A condensed version of this article, “Learning objects need instructional design theory;” is also available at this web site.]


STANDARDS


TOOLS


The following includes biographies of Planning Group participants, along with a sampling of their recent publications or other work. (Most citations appear as they were found on the Internet and have not been reformatted to fit a particular style.)

**Arleen Arnsparger**  
(*Facilitation Team Leader*)

Ms. Arnsparger is an organizational consultant specializing in communications strategies & organizational change. She is currently Interim Vice President for College Advancement at Kingsborough Community College, where she is creating a new institutional advancement focus for one of the six community colleges in The City of New York system. Prior to moving to New York, she served in several positions for the Education Commission of the States (ECS), most recently as Director of Information Services where she managed all communications and clearinghouse functions for the influential education policy organization.

At ECS, she directed all communications, advising governors, legislators and state and school district leaders on strategies to build support for education improvement initiatives, community engagement and media relations. Developed strategic communications plans for state and district education leaders and ECS and designed media and communications strategies to promote national and state dialogue on critical education issues. She began her career as a television news anchor, and reported and wrote for television and radio news. She also produced newscasts, election coverage, news series and documentaries. Selected television credits include:

- Host of The Learning Circuit, a Star Schools project funded by the U.S. Department of Education and aired on PBS stations across the country
- Host of FarView distance learning national teleconferences
- Writer for Soldiers of the Summit, aired nationally on PBS stations
- Writer and featured performer for A House for All Seasons, an award-winning public television series aired nationally by PBS
- Associate Producer of What Do Women Really Want, Anyway? aired nationally by PBS


**Pat Brogan, Ph.D.**

Dr. Brogan is VP of Education and Learning at Macromedia, Inc., where she manages responsibility for Macromedia’s educational business, which now represents about 25% of Macromedia’s business. She also manages online learning strategy, product development and marketing, where the key initiatives are partner programs and learning standards. She has served at the vice president level or higher at several high-technology firms, including Academic Systems Corporation, Elo TouchSystems, Inc., and Giga Information Group, Inc. Her background also includes key positions at Apple Computer, Inc., Borland International, and IBM Corporation.

Dr. Brogan received her Ph.D. in Human and Organization Development from The Fielding Institute, where, her dissertation was on the topic of effective use of computers for learning (comparing cognitive and affective factors in different modes of learning—classroom, computer lab and distance learning). She has published several papers on web-learning, using the web in the classroom, and the evaluation of educational software, and has a deep interest in e-Learning and the effective application of technology to education. She has made a number of presentations on the topics of web and e-learning, at conferences such as Syllabus, Training 2000, Software Publishers Association conference, and others. Among her other interests are serving on the board of directors of a non-profit technology company focused on developing technology skills in disadvantaged youth, and with the Intel Clubhouse program.


**Judy Brown**

As Analyst: Emerging Technology for the University of Wisconsin System, Judy Brown ([www.judybrown.com](http://www.judybrown.com)) conducts research and consults on new computer directions and related technologies for all campuses in the 15 institution UW System. She focuses on partnerships for improving learning with corporate, government and educational institutions and is the Executive Director of the Academic ADL Co-Lab at The Pyle Center in Madison, Wisconsin. (See [www.academiccolab.org](http://www.academiccolab.org).) Previously, she coordinated the Wisconsin Technical College System Hardware and Software Purchasing Consortium and other statewide technology initiatives for 16 technical college districts comprised of 47 campuses.

Brown has been involved with learning technologies for nearly 20 years and has been involved in online learning since writing CBT applications on the mainframe in 1984. She was named one of the Top 100 women in computing by McGraw Hill's Open Computing magazine. For six years she wrote a technology column for the Milwaukee Journal Sentinel and currently writes for the Higher Education Cooperative Purchase Consortium; coordinates eWEEK's Corporate Partner Program; participates in the Masie Consortium; and is on the AACC Commission on Learning and Communications Technologies.
**Tom Carey, Ph.D.**

Dr. Tom Carey is Associate Vice-President (Learning Resources and Innovation) at the University of Waterloo in Canada, where he is a Professor of Management Sciences and also directs a university-wide strategic innovation unit, the Centre for Learning and Teaching Through Technology.

Dr. Carey has leadership roles in three consortia of universities collaborating for online learning resources, including co-chairing the board for the North American MERLOT [http://www.merlot.org](http://www.merlot.org) consortium of 22 state systems and provinces. He was previously co-leader of the Workplace Research theme in the TeleLearning Network of Centres of Excellence, and currently directs research projects in workplace learning with not-for-profit and corporate organizations, including IBM Canada and the Bank of Montreal's Institute for Learning. Dr. Carey is also a Senior Associate of the TLT Group in Washington D.C. [http://www.tltgroup.org](http://www.tltgroup.org), the technology affiliate of the American Association for Higher Education.

Before returning to Waterloo, where he did his M.Math and Ph.D. degrees in Computer Science, Dr. Carey held other university posts as Executive Director of Graduate Program Development and Co-Director of Teaching Support Services, and was one of the founders of Human-Computer Interaction as an academic discipline in Canada. He also holds a B.A. degree from the University of Windsor, where he was awarded a Woodrow Wilson Fellowship and an NSERC Centennial Science Scholarship. Dr. Carey received a Curriculum Contribution Award from the Association of Computing Machinery's Computer-Human Interaction group for his pioneering contributions to curriculum development, and has received various awards for research papers and for corporate-university partnerships.


**Gloria G. Frazier, Ph.D.**

*(Lead Facilitator)*

As Managing Senior Partner of the International Center on Collaboration, Dr. Frazier guides consulting and research services for the leadership and management of large-scale local, state and national systemic change efforts.

Dr. Frazier is known nationally for her ability to understand system design issues, frameworks and benchmark practices of large scale complex organizational change, strategic planning, networking, human resource development, and teaching and learning in addition to the use of formative research skills to support these activities.
Dr. Frazier is a former educator, CEO of a video technologies corporation, Associate Director of the National Alliance for Restructuring Education, and Deputy Director of the National Assessment of Educational Progress.

The Center relates research on learning to the design and implementation of effective collaborative architectures and environments to facilitate sustainable organization and professional development infrastructures. A virtual organization, the Center is composed of a diverse set of associates who believe that visions for a better society can be translated into reality by focusing on the networks, linkages and intersections between people, programs, structures and policies.

Gerard L. Hanley, Ph.D.
Gerard L. Hanley is the Senior Director for Academic Technology Support for the California State University, Office of the Chancellor, Program Manager for the MERLOT project (Multimedia Educational Resource for Learning and Online Teaching), and Director of the Center for Usability in Design and Assessment (CUDA). All these efforts are focused on building and sustaining online communities and resources to improve the effectiveness of teaching and learning in higher education. At the CSU, he also oversees the development and implementation of integrated electronic library resources and academic technology in support the instructional and research programs of the CSU system's 23 campuses. Previously he held the positions of Professor of Psychology, Director of Faculty Development and Director of Strategic Planning at the CSU, Long Beach campus. He received his BA, MA, and Ph.D. degrees from the State University of New York at Stony Brook in Psychology. He has published or presented numerous research and theoretical papers on issues concerning cognition, learning, memory, neuroscience, clinical and community psychology, educational processes & assessment, critical thinking, industrial & organizational psychology, human factors, knowledge engineering, software engineering, systems engineering, and technology in higher education.

In his spare time, Gerry Hanley has worked supporting the Space Shuttle program over the past 12 years as a consultant for Boeing. He designed, delivered, managed, and assessed the Human Space Flight Division Technical Mentorship Program, with over 400 engineers having participated in the program. Since 1999, he has worked with Boeing and their Technical Fellowship Program to develop the Ed Wells Mentoring Program. He has also worked on a number of integrated product development teams over the years, providing guidance on process improvement.


**Barry Harper, Ph.D.**

Professor Barry Harper is Dean of the Faculty of Education at the University of Wollongong in Gwynneville, New South Wales, Australia. He also serves as director of the Digital Media Centre and a Director of the Educational Media Laboratory of the University of Wollongong.

The Digital Media Centre brings together the essential components of digital media research and development in a cohesive and integrated fashion, drawing on the recognised multidisciplinary expertise of the University. Wollongong is uniquely positioned to develop this innovation; our vision, expertise collaborations and infrastructure are aligned with exciting opportunities to form industry alliances that will develop excellence in the creation, management and deployment of digital media. The Educational Media Laboratory is the focus of a graduate teaching and research program in educational technology, incorporating development of innovative interactive multimedia products based on flexibly delivered teaching programs.

Dr. Harper has been the project director for a number of major projects in collaboration with government and commercial partners, is a chief investigator in a large Australian Research Council grant focused on the use of cognitive tools and is one of the project leaders on an Australian University Grant in the Role of Information and Communication Technologies in Flexible Learning.

He has published widely on the use of educational technology in learning. He is on the editorial board of three international journals and a member of the organising committee of the key international conferences in Educational Technology. His areas of research interest include cognitive strategies and instructional processes in education and training and collaborative learning in networked environments.


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**Frances Himes**

Frances Himes is the Associate Vice President of Higher Education at Macromedia, in which position she facilitates the development and implementation of learning technologies that advance distributed learning efforts. During the past 17 years, her work has focused on adaptive learning architecture, dynamic eLearning environments, intercultural forms of learning, and teaching and learning with technology. She has served at the University of Arizona, as both the co-author and Project Director for the Virtual Adaptive Learning Architecture Project and as Director of Global Programs, at Western Michigan University, as Director of Research and Development for Information Technology, and at the University of Wisconsin-Eau Claire, as the Associate Director of International Education.

Himes, F. & Hiens, T. (April 2002). Creating learning objects with Macromedia Flash MX. [white paper for Micromedia] Available at: 

Norin, M. & Himes, F. (April 2002). Building effective higher education partnerships with information technology corporations. [white paper for Micromedia]

**Wayne Hodgins**

Wayne Hodgins is a preeminent authority on hot trends and future directions in the converging space of technology, standards, knowledge creation, creativity and learning. Known by many as “Mr. Metadata” and commonly referenced as the "father" of Learning Objects, having conceived the conceptual model and term over 10 years ago, Mr. Hodgins is regarded one of the most thought provoking futurists in areas such as information and data models, metadata, standards, learning and human performance improvement. He was heavily recruited from Vancouver, B.C. Canada, to join Autodesk in 1988 after almost 15 years in secondary, post secondary and industry education where he held positions of teacher, lecturer, department head, trainer counselor and principal in Canada and Europe. He was recognized as a world leading educator including the 1988 Marshall McLuhan Most Distinguished Teacher award, Top Ten CLO (2001), “New Breed of Visionary for 21st Century” and one “Six for the 21st Century Visionaries” (2000).
In his role as Director of Worldwide Learning Strategies at Autodesk, Wayne Hodgins is the chief architect and strategic futurist responsible for increasing human performance (employees, partners & customers) through what he refers to as Learnativity. Wayne is also the President and co-founder of the Learnativity Alliance which works at the intersection of learning, productivity, creativity and activity and is the inflection point of the New Learning Economy. As a “Strategic Futurist” Mr. Hodgins sits on advisory boards for many industry and government groups, commissions and associations in Canada, USA, Latin America, Asia and Europe and is in great demand to lead major industry wide task forces, and is recognized as the global spokesman for the learning technology standards community and its many organizations including ISO, IEEE, IMS, ARIADNE, GEM, etc. He is currently the elected Chair of the IEEE P 1484 Standards Working Group for Learning Object Metadata, a key advisor and contributor to the Advanced Distributed Learning initiative from the US Dept. of Defense and was most recently asked to be the Special Advisor and Strategic Futurist for the Commission on Technology and Adult Learning.

Recent interviews and articles from Wayne have appeared in: Forbes, PBS, CNN, C-NET, Training & Development, University Business, e-CFO (Chief Financial Officer), OnLine Learning, and InfoWeek. Recent keynotes include those to: World Bank, government leaders of Scandinavia, the US Dept. of Defense, the European Union eLearning Summit, US National Governor's Association, National Association of Manufacturing, IEEE, the European Commission Standards Board (CEN/ISSS), Association of Association Executives, US Coast Guard, Microsoft, Cisco, Siemens, and Nortel.


Laurence F. Johnson, Ph.D.
Dr. Larry Johnson is President and CEO of the New Media Consortium (formerly the New Media Centers and abbreviated as the NMC), an international consortium of colleges, universities, and companies dedicated to using new technologies to inspire, energize, stimulate, and support learning and creative expression. He has a life-long interest in the effective application of information technology in higher education, and has authored a number of books, monographs, and articles on that topic, as well as on the related areas of distance learning, strategic planning, and institutional effectiveness.

Dr. Johnson has more than 20 years of experience in the higher education arena, having served in a variety of roles, including faculty member, dean, vice president, CIO, and president & CEO. An author and principal investigator for several important national and
international studies, he has been recognized for his research by the American Association of Community Colleges and the American Association of University Administrators. His three-year study of the use of computers in developmental education remains the largest formal investigation of computer-based instruction in community college conducted to date. He has served on a number of editorial boards, including the *Community College Journal of Research and Practice*, and is a past editor of *Leadership Abstracts*. He is currently working on his next book, based on a study of 7,000 award-winning faculty, that will focus on the effects and potential consequences of the vast sweep of retirements in community college faculty and staff coming over the next five years.


**Gerry Lang**

Gerry Lang is Learning Strategy Group Manager, Training and Certification, at Microsoft Corporation, where he has served since 1996. He is currently responsible for the learning strategy and vision of Microsoft’s Training and Certification organization, including re-inventing the way Training and Certification “does” business—taking the organization from an instructor-led centric learning product development group to an organization that develops learning content agnostic of the delivery technology. This includes moving a 300 person team to new development tools, new development processes, and new business models.

Prior to this position, Gerry managed the development of the Microsoft Windows 2000 curriculum. Before Microsoft, Gerry was an independent consultant providing learning strategy for several computer-based training programs at both the Los Alamos and Sandia National Laboratories in New Mexico. Earlier work for Science Applications
International Corporation included the development of the Department of Energy’s Yucca Mountain Site Characterization training program; evaluation of the U.S. Marine Corps training feedback and evaluation processes; and training program evaluation of the U.S. Department of State’s anti-terrorism curriculum and courses.

**Elliott Masie**

Elliott Masie is an internationally recognized speaker, futurist, humorist, author and consultant on the critical topics of technology, business, learning and workplace productivity. Elliott is the editor of TechLearn Trends, an internet newsletter ready by over 41,000 business executives worldwide, and the editor of Learning Decisions, a subscription newsletter. He heads The MASIE Center, a thinktank focused on how organizations can absorb technology and create continuous learning and knowledge within the workforce. He leads a consortium of Fortune 500 companies exploring the future of technology in the workplace, including JPMorganChase, Domino’s Pizza, Wal-Mart, McDonalds, Federal Express and the U.S. Departments of Defense and Labor.

Elliott's professional focus has been to demystify the world of technology in order to allow organizations to use their wisdom and resources to make key choices. He has developed models for disseminating technology throughout organizations, providing workforce development with technology and making sense of the buzz and hype of the “e” and “.com” world. Elliott is also considered one of the leading experts in the emerging field of Digital Collaboration.

Elliott serves as an advisor to a wide range of governmental groups and industry consortiums exploring key issues such as “Building the Technology Ready Workforce”, “Knowledge Management: Reality or Hype” and “Creating a Learning Culture in an Organization”. His most recent appointment is to the White House Advisory Council on Expanding Learning Opportunities.

His presentations focus on the ways in which technology will change our organizations and how people can change their approaches and attitudes towards technology. While he has a strong background as a techie, including a stint as President of a division of Ziff Davis Publishing, Elliott is a lifelong educator who believes that most technical things can be translated into the easily understandable. He walks the talk of how technology can be a powerful tool for learning and collaboration.

Elliott is married to Cathy DiMiceli Masie, his partner in the MASIE Center. They live in Saratoga Springs and also spend time in the Adirondack Mountains at a remote retreat for recharging and thinking.

**Michael A. Parmentier**

Michael A. Parmentier is a principal on Booz Allen Hamilton’s Learning Systems Services Team, which is responsible for providing learning strategies and technology-based solutions to its clients. Prior to joining Booz Allen Hamilton, Mike was the Director of Readiness and Training Policy and Programs and a member of the Senior Executive Service in the Office of the Secretary of Defense (OSD). The senior OSD
official responsible for military training and education, he managed a team of professionals that conducted strategic planning and oversight, and advised the Secretary, on all policies, resources, and issues related to the training and education of the U.S. military.

Mr. Parmentier led and was responsible for the internationally recognized Advanced Distributed Learning (ADL) Initiative, a collaborative effort between the public and private sectors to build the foundation for the emerging digital knowledge environment. Under his leadership, the ADL Initiative recently received e-Learning Magazine’s “ELLI” Award and the Inter-Service/Industry Training, Simulation, and Education Conference’s “Governor’s Award” for advances in training. In addition, Mike received the Masie Center’s TechLearn “Mountain Climber” Award and the Department of Labor’s 21st Century Workplace Award for achievement in e-learning.

Mike also represented the Department of Defense on the President’s Task Force for Federal Training Technology. He was a commissioner of the Commission for Technology and Adult Learning, sponsored by the American Society for Training and Development and the National Governors’ Association.

The institutional training programs ($14B) he oversaw included basic military training, flying training, specialized skill training, professional military development and education, training systems and technology, research and development, and the equipment and facilities that support training – notably, the acquisition of aircraft, vehicles, ships, and simulators used to train individuals and units. He also was responsible for collective and joint training programs, which include military exercises and group training, as well as the training of Theater CINC Joint Task Force staffs.

He presents keynote addresses, lectures, leads seminars, moderates panels, and sponsors activities for a variety of national and international professional conferences on a wide spectrum of learning technology, national security, resource allocation, and management topics. These range from "Restructuring and Resizing the Defense Establishment" to "Creating the Digital Learning Environment."

Previously, Mr. Parmentier was a senior analyst in the Office of the Assistant Secretary of Defense for Program Analysis and Evaluation (OSD(PA&E)). There he was responsible for all special operations programs and, earlier, for Southwest Asia regional programs, notably, those that were instrumental in Operations Desert Shield and Desert Storm. He was also the OSD(PA&E) focal point for the Secretary’s Defense Planning Guidance.

Mr. Parmentier received a bachelor’s degree in mathematics and computer science from the United States Air Force Academy. He earned a master’s degree in mathematics and computer science from New York University and a master of philosophy in policy analysis from the RAND Graduate School, where he completed the coursework, and oral and written requirements, for a doctorate in policy analysis.
James C. Spohrer, Ph.D.
As Director of Technology and CTO of IBM's Venture Capital Relations Group, Jim identifies technology trends and potential breakthroughs and then works to establish win-win relationships between VC-backed companies and IBM. Previously he directed the IBM Almaden Research Center's Computer Science Foundation Department, and before that was senior manager and co-strategist for IBM's User Experience/Human Computer Interaction Research effort. From 1989-1998, he was a Distinguished Scientist, Technologist, and Engineer and program manager of learning technology projects in Apple's Advanced Technology Group (ATG). He led the effort to create Apple's first online learning community and vision for mobile any time, any where e-Learning. From 1978-1982, he developed speech recognition algorithms and products at Verbex, an Exxon Enterprises company.

Jim received a B.S. in Physics from MIT in 1978, and a Ph.D. in Computer Science from Yale University in 1988. In 1989, Jim lived in Rome, Italy where he was a visiting scholar at the University of Rome La Sapienza, and lecturer at major universities across Europe. Jim has published broadly in the areas of speech recognition, empirical studies of programmers, artificial intelligence, authoring tools, on-line learning communities, open source software, intelligent tutoring systems and student modeling, new paradigms in using computers, implications of rapid technical change, as well as the co-evolution of social, business, and technical systems. He has also helped to establish two education research non-profit web sites: The Educational Object Exchange and WorldBoard: Associating Information with Places. Jim is a frequent advisor to the National Science Foundation, U.S. Department of Education, and other groups (MERLOT, New Media Centers) on the implications of rapid technological change to the future of education.


Robert A. Wisher, Ph.D.
Dr. Robert A. Wisher is serving as the Acting Director of the Advanced Distributed Learning Initiative within the Office of the Secretary of Defense. Bob has more than twenty years of experience as a research psychologist, first with the Navy and then with the Army, examining the training effectiveness of emerging distributed learning technologies.

Dr. Wisher received a B.S. degree in mathematics from Purdue University and a Ph. D. degree in cognitive psychology from the University of California, San Diego, and has been a visiting scholar at Indiana University. He has published more than 90 technical reports, book chapters, and journal articles related to training, training technologies, and the learning sciences. In 1999, he received the Most Outstanding Achievement Award by an Individual from the United States Distance Learning Association.

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**Ellen D. Wagner, Ph.D.**

Ellen Wagner is Director of Learning Technologies with the Learnativity Alliance, a small research institute and advisory services practice. The Alliance provides a venue for members to access and share new research and best practices about learning, knowledge creation, and human capital management. Dr. Wagner leads the Learnativity Alliance's efforts to explore how technology systems of various kinds can make it easier for people to learn when, where, and how they want to learn. She is particularly interested in research and best practice examples that help designers create learner-centered templates and tools for leveraging learning objects in meaningful ways.

Before joining the Learnativity Alliance, Dr. Wagner was Chief Learning Officer and Director of Education for Viviance AG new education, a Swiss elearning company with offices in 12 European and North American countries. She was Chief Learning Officer and Vice President of Consulting Services with Informania, Inc. before its acquisition by Viviance AG. Wagner's work in the areas of cognition and instruction, assessment, interactivity and interoperability, technology regulation and public policy featured a wide array of media formats, with a special emphasis on Web-based training initiatives.

She and her staff of learning designers, database analysts, content analysts, writers and digital artists completed ground-breaking work featuring technology-based learning and performance improvement designs and implementations in numerous industries (technology, finance, telecommunications, medical, banking) and for government agencies including the U.S. Department of Defense, The U.S. Department of Commerce, the U.S. Department of Education and the U.S. Securities and Exchange Commission. Ellen has designed and managed organization-wide reengineering, change management, and training programs for organizations including the New York Stock Exchange; the Canadian Securities Institute; Wells Fargo Bank; US Bank Corporation; Dell Computer; Hewlett Packard; Næringslivets Hovedorganisasjon (NHO - the Confederation of
Norwegian Business and Industry); Norsk Hydro; the Western Governors University; McKesson Corporation; Kaiser Permanente; Novell; Sun Microsystems; Volkswagen; US WEST (now Quest Communications); Nortel; and AT&T.

Dr. Wagner has written more than 70 book chapters, articles and monographs on instructional design, evaluation, and distance learning. Combined with hundreds of national and international conference presentations, she is a much sought-after speaker in the field. She recently co-authored the book, *Managing Web-Based Training*, with Alan Ellis and Warren Longmire, that was published by the American Society for Training and Development.

Before joining Informania, Dr. Wagner had a successful career as a tenured university professor and administrator. She was Associate Professor and Chair of the Educational Technology Program at the University of Northern Colorado. She was also Director of UNC’s Western Institute for Distance Education and Coordinator of Instructional and Research Technologies with UNC’s Office of Academic Affairs. Ellen served as Visiting Scholar and Project Director at the Western Cooperative for Educational Telecommunication, Western Interstate Commission on Higher Education, where she wrote, obtained, and managed grant-funded education improvement and evaluation projects with budgets in excess of $1,700,000 while on sabbatical leave from the University of Northern Colorado.

Dr. Wagner's Ph.D. in Educational Psychology is from the University of Colorado, Boulder; her MS and BA degrees were earned at the University of Wisconsin, Madison.

**Diana L. Wilkinson**

Ms. Wilkinson is the point-person for e-Learning Services and Strategy & Technical Development, ATT Corporation. She is traveling in Europe until the end of August and is not reachable until then. We will include her bio in the materials you will get at the meeting.

**Invited but unable to attend:**

Stephen Molyneux, LearningLab/ADL Partnership Lab (UK)

Nora Sabelli, SRI