

SREB

*Educational Technology
Cooperative*

Technical Guidelines for Digital Learning Content

*Development, Evaluation, Selection,
Acquisition and Use*

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Southern
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Technical Guidelines for Digital Learning Content

Development, Evaluation, Selection, Acquisition and Use

Introduction

Use of digital learning content by schools and colleges is rapidly increasing. Digital learning content, which may include sharable content objects (SCOs), learning objects and media assets, should be easy to access and use in order to ensure quality course development and address cost issues.

The Educational Technology Cooperative of the Southern Regional Education Board (SREB) established the Digital Learning Content initiative to identify guidelines and develop recommendations to assist those who develop, evaluate, select, acquire and use digital learning content.

Interest in this initiative grew out of concerns about the difficulty of moving learning content between hardware and software environments. This led to the formation of the Digital Learning Content Working Committee within the Educational Technology Cooperative, which pursued the problem vigorously.

The first Web recognition of the committee's work began with the SREB Digital Learning Content Toolbox. (See <http://www.evalutech.sreb.org/digitalcontent/PDC.asp>. Information about supplemental issues concerning digital learning objects, reports and resources for developers, and links to many references on the Web are available there.)

This document is the committee's resulting product. The 20 suggested guidelines detailed here identify the minimum technical requirements for digital learning content. While not directly addressing instructional quality, they encourage the development of all content to the same standards, thus enabling selection of content based on quality rather than on accessibility, technical interoperability, or compatibility with a specific application (such as a Learning Management System).

The guidelines are part of a continuing effort by SREB and its many contributors to keep digital learning content timely and useful.

Intended users include digital learning content:

- providers (e.g., commercial and noncommercial publishers) to guide the development and marketing of digital content for schools and colleges;
- developers (e.g., publishers, institutions and faculty) to ensure that products developed meet digital learning content standards and requirements;
- distributors (e.g., course management software companies) to ensure that the digital learning content they provide and/or support conforms to the standards and requirements needed by schools and colleges;
- procurement officials to ensure that efficient and cost-effective digital learning content is obtained for use in schools and colleges; and
- users (e.g., teachers, faculty and instructional technical administrators) to assist with the selection, adoption and support of the most appropriate digital content for their institutional needs.

It is recommended that providers, developers and distributors of digital learning content to state education agencies, schools, colleges and universities use these guidelines for evaluation purposes to help provide quality assurance to their clients.

Procurement officials and users should use the guidelines for acquisition purposes to assess the features of digital learning content.

Essential Issues and Technical Guidelines ---

Are the essential issues of *accessibility*, *portability*, *usability* and *reusability* in digital learning content considered goals — or requirements? Increasingly, they are both. All four are critical for learners. At the federal level, and in an increasing number of states, accessibility already is required by law. Together, these four essential issues can make digital learning content a ubiquitous reality for instructors and students.

The suggested guidelines below are a tool for considering and assessing digital learning content in the development and use of e-learning courses. Not all of the guidelines will apply to all instances, and they will change over time. Their purpose is to inform decision-makers as digital content is designed, developed and delivered and to help determine the importance of each item.

The four essential issues provide the context to define terms and concepts, to support standards and functionalities, and (in applicable instances) to provide a test of when a guideline is met. For this document, they are defined as:

Accessibility – the degree to which digital content can be accessed by all students, including students with a disability who use assistive technology to see, hear, move or interact with the information.

Portability – the ease with which content can be transferred from one hardware or software environment to another.

Usability – the ease with which users can learn to operate and prepare inputs for and interpret outputs of a system or component.

Reusability – the degree to which a learning object is an autonomous, self-contained unit that can be adapted in other contexts and is durable.

The Guidelines

1. *All content adheres to current W3C guidelines.*

Common standards are essential for effective content development. The W3C (World Wide Web Consortium) protocols and guidelines are recognized internationally as the most comprehensive for ensuring that Web sites are accessible by all members of the community. The work of the W3C has been instrumental in publishing open standards for Web languages and protocols. In addition, the W3C Markup Validation Service is a free service that checks Web documents in formats like HTML and XHTML for conformance to W3C Recommendations and other standards. Minimum guidelines include HTML 4.01. All documents should pass the W3C Markup Validation Service to ensure browser/platform cross-compatibility.

2. *Content is IMS Content Packaging Specification (at least 1.0) conformant.*

The IMS Content Packaging Specification promotes the adoption of open technical specifications for interoperable learning technology. It provides a standardized way for all types of learning content to be exchanged between systems. A package represents a unit of usable (and reusable) content.

SCORM identifies technical standards that enable Web-based learning systems to find, import, share, reuse and export learning content in a standardized way. For a SCORM package to be interoperable, each SCO (a learning object that conforms to SCORM) must contain interfaces to the Learning Management System (LMS). Runtime Environment (RTE) specifies three components (levels 1, 2 or 3) of the interfaces. The three functions are used for launching, tracking, diagnosing and completing SCORM-conformant content. If other certifications such as SCORM 1.2 are met, they should be identified as part of your organization's Guide for Review.

3. *Content is SCORM 1.2 conformant at a minimum (includes IMS Content Packaging Specification 1.1.2).*

SCORM provides a common technical framework for the development of reusable learning objects for Web-based learning. The current SCORM version is preferred.

4. *All content is 508 conformant.*

Conformance to Section 508 of the federal Rehabilitation Act eliminates barriers in information technology, makes new opportunities available to people with disabilities and encourages development of technologies that will help achieve these goals. Direction, guidance, resources, and self-test and certification possibilities are included for checking conformance. Applications designed to address accessibility include but are not limited to: Adobe Acrobat, Flash MX, Authorware, Real Media, QuickTime, Shockwave, Windows Media, PowerPoint, Word and Excel.

5. *All content follows the current Web Accessibility Guidelines (i.e., Web Content Accessibility Guidelines [WCAG] 1.0).*

These guidelines explain how to make Web content accessible to people with disabilities. Content should update to WCAG 2.0 when available.

6. *Content conforms to the National Instructional Materials Accessibility Standard (NIMAS).*

NIMAS is a national file format that guides the production and electronic distribution of digital versions of textbooks and other instructional materials so that they can be more easily converted into accessible formats.

7. *Two-dimensional graphics conform to current Scalable Vector Graphics (SVG) format.*

SVG is a language for describing two-dimensional graphics and graphical applications in XML. Two-dimensional graphics in formats such as Flash, PNG or JPG should be made available in current SVG format as an alternative, or the source should be available for conversion.

8. *Rich media are provided in the user's choice of format, or the source code is provided to enable the user to convert the media to the format of choice.*

Rich media refer to a broad range of digital interactive media. Dynamic motion may occur over time, or it may be in direct response to user action. Audio and video should be available in one of the commonly used formats, such as QuickTime or Real Media, in both low and high bandwidths. More than one available format is preferred.

9. *Rich media are available in low and high bandwidths.*

Video, audio, animation or other rich media must be functional at speeds accessible by dial-up as well as DSL, cable modem or LAN. If the product does not operate at low bandwidth, then an alternative using still images and audio should be available.

10. *Copyrighted rich media and images are protected by technology that prevents them from being downloaded, saved or copied by students once they are placed in the course.*

This guideline conforms to requirements of the TEACH Act. Conformance may involve the use of streaming media, but it also should provide protection of images. Administrators should be able to turn the protection on or off so that content can be manipulated by designers but not by students. Reasonable access, such as limited numbers of print copies, should be given to students for purposes associated with the course. This functionality should be designed in by course developers and not require institutional action or management.

11. *Multiple authentications are not required for users to access content through a secured Web site (Learning Management System, Content Management System, etc.).*

Providing easy access to content is integral to the end-user's experience. Use of third-party digital content should be seamless to end-users. When content is purchased, the LMS, digital content provider and the system administrator should be able to work together to provide a pass-through authentication for end-users, so that no additional authentication or access codes are needed.

12. *Coding will not disable LMS features when the content is used.*

Content code will not disable LMS features when used within the LMS. Content codes include but are not limited to: hyperlinks, tables of contents, navigation elements and user modifications.

13. *Content does not contain code that limits full functionality in other delivery environments, such as cell phones and PDAs.*

Software and plugin requirements must be provided.

14. *Content must be capable of being reorganized and replicated (within the legal terms of use) and remain fully functional.*

An example would include proper use of relative links within the content when rolling over the course to next term. Export and import materials should retain all original functionality.

15. *Content components can be replicated or updated in their entirety or in their individual parts (e.g., test banks, topics/modules, discussions, etc.).*

When a course is updated, portions of course content that were not changed should be capable of being easily replicated in the new course. Content may be hosted outside the institutional system by an Application Service Provider (ASP). ASP solutions publishers should provide the ability for the institution to archive user interactions, usage logs, record of work completed and performance.

In some schools, districts and states, laws require retaining student records. Usage logs and records of work completed have been used in legal issues regarding students. Digital content users should be aware of the regulations in their school and make sure that the publishing company can comply.

16. *Content adopts a file naming convention that is unique, descriptive, meaningful and consistently applied as it relates to the organization of the content.*

To make locating and use of individual files efficient, file names must relate to the learning objectives. This enables each instructor to efficiently reorder content as needed.

17. *Test/question item banks are organized by the learning outcomes they are intended to assess.*

Banks should allow designers to preview and select individual files easily. Files should be organized into folders that correspond to chapters or learning objectives, or a catalog of the bank's content should be provided that includes: 1) designer notes outlining what a particular module, lesson, learning object or activity is intended to accomplish; 2) suggestions for how best to use it; and 3) estimates of the time required to complete the activity. At a minimum, keys, such as manifest files, should be provided to connect files to learning outcomes.

18. *Content maintains the privacy of users, security of information about users and security of users' content.*

Privacy of users, security of information about users and security of users' content must be maintained. In some schools, districts, and states, the Family Educational Rights and Privacy Act (FERPA) has been interpreted to mean that no student records can exist outside of the district servers. Digital content users should query their school, institution and district on privacy of information requirements. Digital content users choosing to have content hosted by a third party should be aware of security procedures used by the host to protect student information and assessment data.

19. *Publisher provides the ability for the institution to archive user interactions, usage logs, record of work completed and performance.*

This applies to content provided through an Application Service Provider (ASP) solution, either within the content or separately. It should be possible for the institution to retain access to this information for a minimum of five years.

20. *At a minimum, technical support is provided for system technology administrators during standard business hours for the duration of the license.*

The amount of technical support needed by a school is a careful blend of several considerations. Each consideration will have cost implications with chosen vendors.

Guide for Review

This guide for review can aid in evaluation of conformance with the suggested guidelines.

No.	Guideline	Conformance		
		Complete	Partial (Explain)	No
1	<i>All content adheres to current W3C guidelines.</i>			
2	<i>Content is IMS Content Packaging Specification (at least 1.0) conformant.</i>			
3	<i>Content is SCORM 1.2 conformant as a minimum (includes IMS Content Packaging Specification 1.1.2).</i>			
4	<i>All content is 508 conformant.</i>			
5	<i>All content follows the current Web Accessibility Guidelines (Web Content Accessibility Guidelines [WCAG] 1.0).</i>			
6	<i>Content conforms to the National Instructional Materials Accessibility Standard (NIMAS).</i>			
7	<i>Two-dimensional graphics conform to current Scalable Vector Graphics (SVG) format.</i>			
8	<i>Rich media are provided in the user's choice of format, or the source code is provided to enable the user to convert the media to the format of choice.</i>			
9	<i>Rich media are available in low and high bandwidths.</i>			

No.	Guideline	Conformance		
		Complete	Partial (Explain)	No
10	<i>Copyrighted rich media and images are protected by technology that prevents them from being downloaded, saved or copied by students once they are placed in the course.</i>			
11	<i>Multiple authentications are not required for users to access content through a secured Web site (Learning Management System, Content Management System, etc.).</i>			
12	<i>Coding will not disable LMS features when the content is used.</i>			
13	<i>Content does not contain code that limits full functionality in other delivery environments, such as cell phones and PDAs.</i>			
14	<i>Content must be capable of being reorganized and replicated (within the legal terms of use) and remain fully functional.</i>			
15	<i>Content components can be replicated or updated in their entirety or in their individual parts (e.g., test banks, topics/modules, discussions, etc.).</i>			
16	<i>Content adopts a file naming convention that is unique, descriptive, meaningful and consistently applied as it relates to the organization of the content.</i>			

No.	Guideline	Conformance		
		Complete	Partial (Explain)	No
17	<i>Test/question item banks are organized by the learning outcomes they are intended to assess.</i>			
18	<i>Content maintains the privacy of users, security of information about users and security of users' content.</i>			
19	<i>Publisher provides the ability for the institution to archive user interactions, usage logs, record of work completed and performance.</i>			
20	<i>At a minimum, technical support is provided for system technology administrators during standard business hours for the duration of the license.</i>			

Related Terms and Web Sites

These definitions of the terms and Web sites referenced in the guidelines provide extended explanations of pertinent digital learning content terminology.

Accessibility	The degree to which digital content can be accessed by all students, including students with a disability who use assistive technology to see, hear, move or interact with the information.
ASP	An Application Service Provider, a third-party entity that hosts software-based services and solutions off site.
Asset	Any electronic representation of media such as text, images, sound, or any other piece of data a Web client can deliver. The most basic form of content is an asset. Assets include but are not limited to file types such as .doc, .wav, jpeg, .fla, .mov, .gif, .avi and .html. (See the Encyclopedia of Educational Technology at http://coe.sdsu.edu/eet/ .)
CAST (Center for Applied Special Technology)	An organization that works to expand learning opportunities for all individuals, especially those with disabilities, through the research and development of innovative, technology-based educational resources and strategies. (See http://www.cast.org/ .)
CATEA (Center for Assistive Technology and Environmental Access, Georgia Institute of Technology)	A unit of the university that focuses on: 1) development, evaluation and utilization of assistive technology (technology or devices designed to allow or improve performance of activities of daily living or work); and 2) design and development of accessible environments (environments, private and public, accessible to all people, including those with disabilities). (See http://www.catea.org/ .)
Content Aggregation Model	A set of standards for defining the data and content in a SCO using XML (Extensible Markup Language) and packaging the SCO for electronic delivery between systems. Together, the Content Aggregation Model (CAM) and the Runtime Environment (RTE) allow the exchange of Sharable Content Objects. (See the definitions of <i>manifest file</i> and <i>RTE</i> .)
Content packaging specification	Refers to the standard format for packaging the final SCO for electronic transfer. Content packaging refers to the definition for delivering and exchanging structured content (learning objects and courses) between different LMSs. (See the definition of <i>IMS Global Learning Consortium</i> .)
DAISY (Digital Accessible Information System) Consortium	An organization that developed digital standards for talking books that permit everyone — but especially those who are blind, visually impaired or have another print disability — to experience a better way to read. (See http://www.daisy.org/ .)
Digital learning content	Any content used for educational purposes that is available in a digital format.

<p>Digital Learning Content Toolbox</p>	<p>The SREB Digital Learning Content Toolbox, a collection of resources on the SREB <i>EvaluTech</i> Web site, provides policy and technical digital content resources for schools, colleges and state education agencies. The resources are organized into two topical areas: <i>accessibility</i> and <i>portability/usability</i>.</p> <p><i>Accessibility</i> addresses Section 508 of the federal Rehabilitation Act and related disability issues.</p> <p><i>Portability/usability</i> relates to the migration of digital content to student learning materials, including e-learning courses. (See http://www.evalutech.sreb.org/digitalcontent/PDC.asp.)</p>
<p>eLearning Management System (eLMS)</p>	<p>See Learning Management System (LMS).</p>
<p>Family Educational Rights and Privacy Act (FERPA)</p>	<p>The Family Educational Rights and Privacy Act (FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education. (See http://www.ed.gov/policy/gen/guid/fpco/ferpa/index.html.)</p>
<p>File naming conventions</p>	<p>Consistent standards that help create an efficient, well-organized site, as detailed in the EERE Communication Standards and Guidelines for creating file and directory naming conventions. (See http://www.eere.energy.gov/communicationstandards/web/naming.html.)</p>
<p>IMS Global Learning Consortium Content packaging specification</p>	<p>An organization that supports the adoption and use of learning technology world-wide.</p> <p>The scope for IMS content packaging and other specifications, broadly defined as “distributed learning,” includes both on-line and off-line settings, taking place synchronously (in real time) or asynchronously. Thus the learning contexts benefiting from the IMS specifications include Internet-specific environments (e.g., Web-based course management systems) as well as those that involve off-line electronic resources (e.g., a learner accessing learning resources on a CD). The learners may be in a traditional educational environment (school classroom or university), in a corporate or government training setting, or at home.</p> <p>(See http://imglobal.org/background.html. For a specific content specification, see http://www.imglobal.org/content/packaging/. Also see the definition of <i>content packaging specification</i>.)</p>
<p>Interoperability</p>	<p>The degree to which a learning object is independent of the LMS and the media within which it is delivered.</p>
<p>Learning Management System (LMS)</p>	<p>A product such as Angel, Blackboard, Desire2Learn, eCollege or WebCT that facilitates the delivery of distributed learning.</p>
<p>Learning object</p>	<p>Any digital resource that can be reused to support learning. A learning object that conforms to SCORM is called a SCO.</p> <p>A “durable” learning object means that its functionality is designed to survive over time. This enables the inclusion of benefits to learners as well as provisions for adaptation (reusability) for use by a larger audience.</p>

Manifest file	<p>A text file that describes the contents of a package and the order in which the SCOs are to be delivered and tells the LMS where to find the SCOs themselves.</p> <p>One of several types of manifest files, a content aggregation is a collection of Sharable Content Objects (SCOs). (See a complete description of manifests and conformance requirements in the ADL SCORM Specification at http://www.adlnet.org/.)</p>
Metadata	Data about the data (the SCO) that allows the learning object to be found. It may be located separately from the resource (the SCO) it describes or embedded within that source. It also includes technical requirements, educational context, title, author, version number and creation date.
National file format	A standard format for producing educational materials in electronic format. (See the definition of <i>NIMAS</i> .)
NCAM (National Center for Accessible Media) Rich media accessibility	An organization that furnishes a growing collection of resources for developers and users who are interested in ways to make rich media accessible to people with disabilities. (See http://ncam.wgbh.org/ . Also see the definition of <i>rich media</i> and information about rich media accessibility at http://ncam.wgbh.org/richmedia/index.php .)
NIMAS (National Instructional Materials Accessibility Standard)	<p>Endorsed by the U.S. Department of Education, Office of Special Education Programs, NIMAS is the official standard for publisher source files to guide the production and electronic distribution of accessible, alternate format versions of textbooks and other instructional materials.</p> <p>NIMAS was established as a mandate for K-12 print publishers, state education agencies (SEAs) and local education agencies (LEAs) in the Individuals with Disabilities Education Improvement Act of 2004. Some states also require the NIMAS format to make higher education course materials accessible.</p> <p>The DAISY/NISO 2004 standard is a comprehensive specification for multimedia material, and NIMAS is a subset of the DAISY/NISO 2004 DTD, DTBook. (See http://nimas.cast.org/. For the NIMAS technical specification, version 1.0, see http://nimas.cast.org/about/technical/index.html. For the accessibility standard report, version 1.0, see http://nimas.cast.org/about/report/.)</p>
NISO (National Information Standards Association)	An association accredited by the American National Standards Institute (ANSI) that identifies, develops, maintains and publishes technical standards to manage information. Developed through consensus, NISO standards identify model methods, materials and practices for libraries, bibliographic and information services, and publishers. (See http://www.niso.org/about/ and http://www.ansi.org/ .)
Plugins	A small piece of software that enriches a larger piece of software by adding features or functions. Plugins enable browsers to play audio and video. Shockwave, RealPlayer and QuickTime are examples of plugins. (See http://www.plugins.com/browser/ .)
Portability	The ease with which content can be transferred from one hardware or software environment to another.

Reusability	The degree to which a learning object is an autonomous, self-contained unit that can be adapted in other contexts and is durable. “Reusing” means using the object as it is, including using it as part of another resource, and adapting it to suit learning outcomes that may be from different disciplines. “Durable” means that the functionality of the learning object will survive over time.
Rich media	Information that consists of any combination of graphics, audio, video and animation that is more storage- and bandwidth- intensive than ordinary text. (See NCAM National Center for Accessible Media.)
Runtime Environment (RTE)	The physical platform that sets standards for utilizing the Shared Content Object in the target Learning Management System. The Runtime protocol utilizes JavaScript, a standard Web-programming language, to define a common interface for Shared Content Objects. Together, the Content Aggregation Model (CAM) and the Runtime Environment (RTE) allow the exchange of Sharable Content Objects. (See the Encyclopedia of Educational Technology at http://coe.sdsu.edu/eet/ .)
Scalability	The ability of a product to meet growth needs.
Scalable Vector Graphics (SVG)	A language for describing two-dimensional graphics and graphical applications in XML for the Web. (See http://www.w3.org/Graphics/SVG/ .) SVG 1.1 Specification forms the core of the current SVG developments, W3C Guidelines, January 14, 2003. (See http://www.w3.org/TR/SVG/ .)
SCO (Sharable Content Object)	A collection of assets that becomes an independent, defined piece of instructional material. SCOs are the smallest logical unit of instruction that can be delivered and tracked via a Learning Management System. (See the definition of <i>asset</i> .)
SCORM (Sharable Content Object Reference Model)	The de facto standard for learning resources that are deployed using a Learning Management System. Developed by the Advanced Distributed Learning Network (ADL), SCORM utilizes XML (Extensible Markup Language) and JavaScript as standards to define a protocol for application developers to create instruction that can be shared between Learning Management Systems that utilize different technologies and structures. (See http://www.adlnet.org/scorm/ and http://www.adlnet.org/) SCORM includes two distinct areas: the Content Aggregation Model (CAM) and the Runtime Environment (RTE). Together, these standards allow the exchange of Sharable Content Objects (SCOs). There are many descriptions of SCORM on the Internet. (See a concise graphic description in the Encyclopedia of Educational Technology at http://coe.sdsu.edu/eet/ .)
Section 508 Accessibility Standards	Standards established by law in 1998 when Congress amended the Rehabilitation Act of 1973 to require that electronic and information technology developed, procured, maintained or used by federal agencies be accessible to people with disabilities. (See http://section508.gov/index.cfm?FuseAction=Content&ID=12.)
Sharable Content Object (SCO)	A collection of assets that becomes an independent, defined piece of instructional material. A SCO is a learning object that conforms to SCORM. (See definition of <i>asset</i> .)

Sustainability	The ability of a product to remain manageable over time with a minimum of technical effort.
The TEACH Act American Library Association, 2004	The TEACH Act redefines the terms and conditions under which accredited, non-profit educational institutions throughout the U.S. may use copyright-protected materials in distance education (including on Web sites and by other digital means) without permission from the copyright owner and without payment of royalties. (See the American Library Association commentary at: http://www.ala.org/ala/washoff/WOissues/copyrightb/distanced/Default3685.htm .)
Usability	The ease with which users can learn to operate and prepare inputs for and interpret outputs of a system or component.
Voluntary Product Accessibility Template	Information that assists federal contracting officials in making preliminary assessments regarding the availability of commercial electronic and information technology products and services with features that support accessibility. (See http://www.itic.org/policy/vpat.html .)
Web Content Accessibility Guidelines (WCAG 1.0)	Information on how to make Web content accessible to people with disabilities. (See http://www.w3.org/TR/WAI-WEBCONTENT/ .)
W3C Technical Reports and Publications	Free software standards (called “Recommendations”) produced by the World Wide Web Consortium (W3C) for the World Wide Web. (See http://www.w3.org/TR/ .)
W3C Markup Validation Service	A free service that checks Web documents in formats like HTML and XHTML for conformance to W3C Recommendations and other standards. (See http://validator.w3.org/ .)
XML (Extensible Markup Language)	A W3C-recommended, general-purpose markup language that combines text and extra information about the text. This allows creation of a special-purpose markup language to facilitate sharing a wide variety of data across different systems. (For formal technical specifications, see http://www.w3.org/XML/ .)

Additional Resources

These selected resources represent a few of the many links, articles and white papers that are related to this document and are available on the Web. It is not intended to be a definitive list.

Brown, Judy and the ADL Academic Co-Lab Staff. "Making a Macromedia Flash MX Learning Object SCORM-Conformant." Macromedia. 2002.
(http://download.macromedia.com/pub/solutions/downloads/elearning/scorm_flashlo.pdf)

This paper provides background information on both the Advanced Distributed Learning (ADL) initiative and SCORM, offers an advanced overview of SCORM, and details a demo created with Macromedia Flash MX that illustrates the communication and tracking between a learning object and a Learning Management System.

Encyclopedia of Educational Technology. Edited by Bob Hoffman, San Diego State University Department of Educational Technology. 1994-2004.
(<http://coe.sdsu.edu/eet/>)

The Encyclopedia of Educational Technology (EET) is a collection of short multimedia articles on a variety of topics related to the fields of instructional design and education and training.

McGreal, Rory. "Learning Objects: A Practical Definition." *International Journal of Instructional Technology and Distance Learning*. September 2004.
(http://itdl.org/Journal/Sep_04/article02.htm)

The author provides a rationale that relates variations in terminology of learning objects into a single practical definition of LOs. An extensive bibliography of resources is included.

Packaging and Publishing Learning Objects: Best Practices Guidelines. United Kingdom: Becta. January 2005. (http://www.becta.org.uk/page_documents/industry/content_packaging.pdf)

Becta is the U.K.'s key partner in the strategic development and delivery of its information and communications technology (ICT) and its e-learning strategy for schools and the learning and skills sector. To quote: "This set of best practice guidelines has been developed in consultation with representatives of the e-learning industry to provide a framework for the achievement of learning content that is accessible, durable, reusable and interoperable across learning platforms used in education."

Pasini, Nina. "The Role of SCORM in E-Learning." Carnegie Mellon University. 2004. (<http://www.lsal.cmu.edu/lsal/expertise/papers/notes/scormrole20040119/scormrole-v1p0-20040119.html>)

This white paper helps distinguish the difference between instructor-led training and other types of learning and discusses how SCORM fits into the e-learning strategy.

Paving the Way: the Way to Excellence in E-Learning. National Learning Network. United Kingdom: Becta. 2002. (<http://www.nln.ac.uk/materials/default.asp>)

Available in text format with video clips, this effort shows college staff and students, commercial developers and National Learning Network partners discussing the creation of highly engaging, interoperable and accessible learning materials. The processes and procedures to achieve these goals are described. Also available as a reference document.

Principles of Effective Learning Objects. Southern Regional Education Board. 2005. (<http://www.sreb.org/programs/EdTech/pubs/PDF/PrincipalsEffectiveLearningObj.asp>)

Learning objects are digital content that can be used and reused for teaching and learning, and they possess other adaptable characteristics that extend many learning activities. This publication defines learning objects in the context of the SCORE (Sharable Content Objects Repository for Education) initiative of the Southern Regional Education Board, outlines guidelines for SCORE participants and provides evaluation criteria of learning objects.

Reusable Learning. The Reusable Learning Project. 2003-2005. (<http://www.reusablelearning.org/>)

The Reusable Learning Project is concerned with digital learning resources that include Web-based content, digital documents, applets and software, simulations, data sets, interactive learning environments and multimedia resources. An extensive glossary can be found at <http://www.reusablelearning.org/glossary-print.asp>. This site is supported in part by funding from the National Science Foundation, National STEM Education Digital Library and the National Science Digital Library.

SCORE: *Sharable Content Object Repositories for Education* (in press). Southern Regional Education Board. [2005].

Participating states in the SREB region are developing a sharable database (repository) of reviewed course content (learning objects). The goal of SCORE is to improve teaching and learning and achieve costs savings. (To be published on the SREB Educational Technology Cooperative Web site at <http://www.sreb.org/programs/EdTech/edtechindex.asp>.)

SCORM. Randall House Associates. n.d.
(<http://www.rhassociates.com/scorm.htm>)

This graphic overview of the Sharable Content Object Reference Model (SCORM) makes difficult technical standards more understandable. Randall House Associates provides technical consulting services to the U. S. Department of Defense.

SCORM: *Best Practices Guide for Content Developers*. Carnegie Mellon University. 2003.
(<http://www.lsal.cmu.edu/lsal/expertise/projects/developersguide/developersguide/guide-v1p1-20050405.pdf>)

This best practices guide is for content developers, instructional designers, writers, programmers, and subject matter experts tasked with creating new content that is SCORM conformant or converting existing content into SCORM-conformant content. This 1st edition of the *Guide* has updates to the sequencing rules and templates in *SCORM 2004*, 2nd edition. (Other content development resources may be found at [http://www.lsal.cmu.edu/lsal/expertise/projects/developersguide/.](http://www.lsal.cmu.edu/lsal/expertise/projects/developersguide/))

