STANDARDS FOR E-LEARNING

Consumers’ guide

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By William Horton
LEGAL STUFF

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STANDARDS FOR E-LEARNING

Consumers’ guide

Standards for e-learning are bursting forth from committees, infiltrating sales brochures, blossoming on shrink-wrapped boxes of authoring tools, and popping up on purchasing requests for courseware.

Much has been said and written about standards, but most of that comes from the perspective of the developers and publishers of standards and of those using standards to promote their products. Though mostly honest, these sources have a viewpoint that may not coincide with yours.

Here we will consider standards from the viewpoint of consumers. By consumers, we mean those who use standards. Consumers include those who buy courses, media, authoring tools, learning management systems, and other tools whose value may depend in part on compliance with standards. Consumers also include those who develop these same items, especially developers of courses and other reusable components of learning.

At the end of this module, you should have the knowledge to decide how you will react to proposed standards and what actions you can take to implement or resist them.
THE DREAM

To understand the frenzy over e-learning standards, we should start by considering the dream of a better world promised by standards, for it is this dream that should motivate our inquiries and our efforts. What is this dream? What do you and your organization stand to gain from standards? If standards are followed, how will your work and life be easier, more productive, and more secure?

Goal: Reuse content at all levels

One of the explicit goals of standards is to allow us to reuse content at all levels—not just whole courses and online books, but smaller units as well. The idea is that we define reusable knowledge objects. These objects are also called learning objects and sharable content objects. They represent units of content that developers can reuse for different purposes in different projects. We can reuse entire courses or books; their lessons or chapters; their individual topics, pages, or displays; and even their content modules.

Make all units of content reusable:

What content at each of these levels could you reuse?
Standards for e-learning

Goal: Build from reusable parts

The modularity of knowledge objects lets us build from reusable parts. That means we will not need to develop all the content we need for a particular project. Components, once perfected, can be reused on several projects.

At the top level we can assemble a curriculum from reusable courses.

To create courses, we can shop for proven lessons. Effective lessons may contribute to multiple courses.

To create the lessons, we may combine existing pages. Relevant, well-crafted pages may appear in multiple lessons.

Pages, likewise, may be composed by including existing lower-level modules. These content modules may consist of reusable boilerplate text, standard graphics, narration segments, animations, and video clips.

Even though we may still have to develop original content, the costs will be less because that original content can be reused in subsequent projects.

Are there existing components you could use in assembling your curricula, courses, lessons, and pages?
The Holy Grail: interoperability

The holy grail of standards is interoperability—interoperability among authoring tools, content, and management systems. Let's see what might be possible with true interoperability.

Consumers of learning products will probably access them through a learning management system.

Producers, in this context, are the people and organizations that produce learning products. Imagine that we have a couple of producers, Producer A and Producer B. Each producer uses certain tools to produce knowledge objects, that is, self-contained, reusable modules of training. Tools are things like Dreamweaver, ToolBook, Trainersoft, or Authorware. Suppose that Producer A uses Tool X to produce Object 1 and Tool Y to produce Object 2. Producer B then uses Tool Z to produce Object 3 and Tool X to produce Object 4. In this brave new world, the learning management system can assemble a course by integrating these separate objects developed by different producers using different tools.

Furthermore, we can replace the learning management system with another of comparable capabilities, without having to redevelop or reassemble our course.

Interoperability allows consumers pick the best producers, tools, content, and management systems—and to swap out any of them without having to redo any others. How would such true interoperability improve your operations?
STANDARDS IN THE REAL WORLD

Before examining specific e-learning standards, it may be worthwhile to think about standards in general and how they often, but not always, make our world better. To evaluate e-learning standards, we need to know what kinds of standards have positive effects and which do not. We need to set realistic expectations for standards and acquire the perspective we need as consumers who must decide on the standards offered for our use.

Standards changed the world

Standards have changed the world, especially ones that promote the free exchange of high-quality goods, services, and knowledge.

Some examples include interchangeable light bulbs and sockets, which means we do not have to buy bulbs solely from the manufacturer of the socket. Standardized batteries mean that we can obtain batteries from several different vendors, and the batteries will work in more than one brand and type of device. The standard 35-millimeter film cartridge meant that I did not have to buy five different kinds of film for all the cameras I once owned. Widely accepted credit cards mean that we can carry them in billfolds rather than backpacks, as would be the case if we needed a separate card for each store or organization from which we purchased goods.

This standardization that began with Samuel Colt’s use of interchangeable parts in his manufacture of hand guns has made possible the low-cost, high-quality goods and services we take for granted today.

Can you think of some more standards that changed the world? Recall your last workday from the time you awoke till you fell asleep. Which of your daily activities were made possible or just practical by standards?

Standards that did not work

Not all standards work. Many proposed standards never achieved widespread and enduring effect or consumer support. Some examples include the following:
Eight-track tapes were in many ways technically superior to audio cassettes, yet audio cassettes won the format wars of the 1970s and are still around today.

The Ada programming language offers a telling example of how even powerful supporters cannot guarantee acceptance of a standard. In the 1980s the U.S. Department of Defense decreed that all computer programming for the U.S. military would henceforth be done in the Ada programming language. It is ironic that many people today are saying that the SCORM e-learning standard cannot fail because it has similar support from the Department of Defense.

Esperanto was proposed as a more logical, more consistent alternative to natural languages such as English, Chinese, and French. Yet it has not achieved widespread usage and no nation has adopted it as an official language.

Xanadu. In the 1970s, Ted Nelson proposed a hypertext system called Xanadu that in hindsight looks like what the World Wide Web has become; only Xanadu was more systematic and efficient. Yet it was the messy, uncontrolled, un-designed Web that changed the world, leaving Xanadu as an interesting footnote.

If you cannot recall some of these standards, don’t worry. It is because they achieved the obscurity they probably deserved. Can you think of some more examples of things that were touted as the next big standard but that failed to catch on or that lost out to economic competition?

Why did these standards fail? Some were technically superior and had the backing of powerful organizations. What else do standards need to succeed?

What is a standard?

So, what is a standard? That is one of those philosophical questions like “If a tree falls in the forest and no one is there to hear it, does it make a sound?” The answer to that question has long been debated.

Perhaps we should ask a similar question about standards. “If a standard is written and nobody follows it, is it really a standard?” The answer to this one is no. The reason is that a written specification is not a standard. Specifications, guidelines, recommendations are not a standard unless large numbers of people follow them.

Different kinds of “standards”

The term standard is used to describe several methods by which conformity and consistency are achieved. These different types of standards vary in the base of their authority and their degree of influence. Three main types of standards are de jure, de facto, and internal. Within de facto standards there are two sub-types: proprietary and conventional.
### Standards for e-learning

<table>
<thead>
<tr>
<th>De Jure</th>
<th>De Facto</th>
<th>Internal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requires:</td>
<td>Requires:</td>
<td>A team creates and</td>
</tr>
<tr>
<td>• Specification</td>
<td>• A large number</td>
<td>follows its own</td>
</tr>
<tr>
<td>• Authority</td>
<td>of people use the</td>
<td>rules.</td>
</tr>
<tr>
<td>• Certification</td>
<td>same product.</td>
<td>Examples:</td>
</tr>
<tr>
<td>Examples:</td>
<td>Examples:</td>
<td>• Color</td>
</tr>
<tr>
<td>• ISO 9000</td>
<td>• MS Office</td>
<td>• Layout</td>
</tr>
<tr>
<td>• TCP/IP</td>
<td>• PKZIP</td>
<td>• Terminology</td>
</tr>
<tr>
<td>• Electrical codes</td>
<td>• Adobe PDF</td>
<td>• Interaction</td>
</tr>
</tbody>
</table>

*De jure* is Latin for “in law.” De jure standards are based on written laws or regulations, though the term also covers standards issued by professional organizations as well as government bodies. De jure standards require a complete and unambiguous written specification, the authority of an authenticating organization, and a certification process whereby compliance with the standard can be verified and attested to. Examples of de jure standards include the ISO 9000 quality control standards; the TCP/IP standard that governs exchange of data over Internet connections; and electrical codes for wiring in homes and office buildings.

The term *de facto* is Latin for “in fact” and is used to describe standards that are widely followed though they lack regulatory authority. De facto standards are most common in rapidly changing fields where the regulatory process has not had time to operate. Two types of de facto standards are common: proprietary and conventional.

Proprietary standards occur when a large number of people use the same product. Essentially the standard is set by the manufacturer of the product and adoption comes in the form of market acceptance. Examples of de facto standards include Microsoft Office programs, the PKZIP compression format, and Adobe’s Acrobat PDF file format. Originally each of these manufacturers faced strong competition. Lotus and Word Perfect had competing suites of programs, but Microsoft’s products achieved large enough share of the market to be relied upon as a standard. Keep in mind that to be a proprietary standard a product does not require total market dominance, just enough users to form a community within which the product enables free interchange of documents or other components of work.

Conventional standards occur where groups of people more or less follow the same set of rules. Adherence to conventional standards comes about because the standard way of doing things is significantly more effective, less costly, quicker, or more convenient. Examples include human languages such as French, the physical structure of books, and the placement of button holes. Although there are French government agencies that try to regulate the French language, its coherence and effectiveness depends mainly on conventions of usage and the fact that departing from these conventions makes one less likely to be understood. There is no law that says that books have a cover, that the title page and table of contents appear at the front, and that the index goes at the back—
yet almost all books are made that way. What determines that men’s and women’s clothing put button holes on left or right? Convention does.

Internal standards are the rules proposed and followed by a specific team. On a multimedia development project, we might find standards for color usage, screen layout, terminology, and styles of interactivity. Such internal standards usually aim at achieving consistency of results and efficiency of production.

Can you think of more examples of each type of standard? How about some examples of a standard that started out as one type but later became another type?

What type of standard is it?

Take a moment to see if you can discriminate among the different types of standards. Can you match each standard on the left with its type on the right?

<table>
<thead>
<tr>
<th>Match the standard with its type.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macromedia Flash file format</td>
</tr>
<tr>
<td>Color scheme of CNN.com</td>
</tr>
<tr>
<td>Driving on left side of road in UK</td>
</tr>
<tr>
<td>Which hand holds the fork</td>
</tr>
</tbody>
</table>

The Macromedia Flash file format is a proprietary standard set by Macromedia. The color scheme of CNN’s Website is an internal standard authorized by CNN management and applicable only to developers of that site. Driving on the left side of the road in the UK is the law there. Hence this is a de jure standard. Which hand holds the fork is a convention—one that varies from one side of the Atlantic to the other.

Can you spot additional examples of each type of standard?
Multiple standards may coexist

To be effective, standards do not have to completely eliminate competing alternatives. A small number of standards can co-exist and each be effective.

For example, consider standard ways of conveying food from plate to mouth. In European cultures, the most common method is the knife-fork-spoon standard. In China and Japan, the chopstick standard has existed for millennia. In India and at fast-food restaurants, the fingers-and-hand standard may prevail. Most of us can use these standards interchangeably as demanded by social circumstances and the content of our plates.

Electrical sockets, plugs, and voltages differ around the world; but with just a handful of voltage converters and plug adapters, your electrical devices can be made to work just about anywhere.

Batteries likewise vary. Take a trip to Radio Shack and count the number of different shapes and voltages of batteries for sale. Such variety is necessary. Think about how many hearing-aid batteries it would take to crank your car.

Can you think of some more areas where multiple standards co-exist and are beneficial? When are multiple standards better than one standard? How many competing standards are too many? Is there room for more than one e-learning standard?

Standards do not last forever

Standards do not last forever. Most standards hold sway for a period of time and then are replaced or just ignored. Think about some widespread standards that are no longer in effect.
Probably the biggest and longest-running standard was the dino-standard. For hundreds of millions of years dinosaurs were at the top of the food chain. For centuries, quill pens were the standard writing implement. The standard personal computer was once an IBM-PC running MS-DOS. Double-sided razors were once a standard as were vinyl records. But no longer. Some standards were replaced by new standards, while others were replaced by such a variety of competitors that no standard may be visible. Some vanished overnight, but others were replaced gradually. Some were replaced outright and others evolved into a new, more advanced standard.

To fully appreciate standards we need to understand what makes a standard obsolete and how we can determine if a standard has outlived its usefulness.

What standards have you seen come and go in your lifetime?

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**Standards reduce variety**

The role of standards is to reduce variety. Even standards enforced only culturally can limit choices—for better or worse. Consider the example of the development of the “standard” automobile that occurred over the 20th Century.

![Early 20th Century Automobile](image1.png) ![Early 21st Century Automobile](image2.png)

Early in the 20th Century, there was no standard notion of what constituted an automobile. You could choose between steam or internal combustion engines; a chassis with 3, 4 or 6 wheels; steering by rudder, ropes, or a wheel; and an engine in the front, back, or middle. Today, early in the 21st Century, 98% of automobiles have internal-combustion piston engines, 4 wheels, a steering wheel that turns clockwise to turn to the right, and an engine in the front. Porches and Ferrari’s aside, we have achieved a standard that makes comparisons simpler and encourages innovation at the detail level.

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**Variety possible within standards**

Although standards reduce variety and may constrain technical progress, good standards leave enough room to meet a wide range of human needs within the standard.
Consider the standard Roman alphabet. Each letter has a defined shape. Yet variations are possible in the basic form of the shape to create additional typefaces. Within a typeface, the shape can be thickened, slanted, and even colored to achieve even more variations. The rich variety of typography possible shows that a standard need not limit a creative mind.

Consider, too, the variety of shapes and forms recognized as a chair. Variations of seat, backing, arms, and padding offer innumerable combinations.

Probably one of the most restrictive technical standards of modern times is that for the audio CD. Little is left to the imagination—except the content recorded on disks. A tightly standardized medium supports a wide variety of artistic and perhaps not so artistic expression.

Good standards do not necessarily constrain creativity but provide a stable ground on which it can flourish. How much should standards limit and how much should they allow? What do you think is an appropriate balance point?

**Standards may constrain progress**

We need to realize that standards can constrain progress.

Typewriters gained widespread acceptance only after the layout of keys was standardized so that a typist trained on one brand of typewriter could quickly adjust to another brand. Typewriters have been refined, electrified, and computerized. Typewriters have lent their basic layout to personal computers, but one thing has not changed much since early models: the organization of the keyboard.

**QWERTY keyboard**

- Layout prevents jamming keys.
- Slows typing.
- Too painful to change.
Standards for e-learning

The upper-left row of keys begins QWERTY, hence the common term “qwerty keyboard” to describe such a layout. Why do keys on even the fastest computer workstation follow this basic layout? Because it is the most ergonomically efficient? No, in fact, hundreds of student projects in human factors have shown that this layout makes poor use of human reach and dexterity. In fact, it was designed specifically to slow down typists who repeatedly jammed the keys by typing quicker than the early typewriter mechanism could respond. Today, keyboards can respond hundreds of times faster than typists, but the keyboard layout remains unchanged. Why? Because current users still learn to type based on the QWERTY keyboard, and retraining them would prove painful.

Standards may also constrain efficiency. Europeans eat with the fork in the left hand. Americans eat with the fork in the right hand. Because Americans must transfer the fork to the left hand to hold items being cut with the knife, they are less efficient in eating than Europeans. Why is the standard way of holding the fork different in the first place? Because during colonial times, silver and pewter were in short supply and most colonials could not afford both a fork and a spoon. The fork took the place of the spoon, literally. As a result, a quarter of a millennium later, affluent Americans waste four months during their lifetime.

What makes a standard effective?

Let’s consolidate our wisdom. What are the characteristics of successful standards? List as many as you can think of.
E-LEARNING STANDARDS

We now can consider four types of emerging standards for e-learning. For each, we will discuss what they specify, what organizations issue these standards, and how we can make the courses we create comply with these standards.

Components and standards

Let’s look at the main types of standards and how they enable interchange of components in a learning system. On one side we have the consumers of training and on the other, the producers of training content.

Producers create individual modules or knowledge objects, which must be integrated into a unified course. Standards that allow assembling courses by integrating modules authored in different tools by different producers are called packaging standards. These same standards enable a learning management system to import and organize all the components of the course.

A second group of standards are necessary so that learning management systems can launch individual lessons and other components and can administer tests and other assessments. These standards are called communications standards, and they specify how the consumer and the learning management system exchange information.

A third group of standards specify how producers can prepare descriptions of their courses and other modules so that the learning management system or other software can compile catalogs of available learning content. These standards are called metadata standards.

A fourth group of standards concerns the quality of modules and courses. These quality standards govern overall course and module design as well as accessibility by those with disabilities.

Though somewhat independent, these four types of standards all contribute to the goal of mixing of high-quality components to create richer, more effective learning solutions.
Standards organizations

Who are the players in the drama of standards? Within the area of e-learning technology, four main groups are active in proposing standards.

The oldest among these is the Aviation Industry CBT Committee, or AICC for short. Though originally formed to serve airframe manufacturers, suppliers, and buyers, the AICC has expanded its base to include many other organizations producing and using e-learning content.

Other organizations actively authoring standards are the IEEE’s Learning Technology Standards Committee and the IMS Global Consortium.

Another member of this elite club is the Advanced Distance Learning (ADL) group’s Sharable Content Object Reference Model (SCORM) project. SCORM claims that it does not author standards but will adopt and make practical the best standards put forth by the other groups. However, SCORM has done some serious tinkering with standards and each group is greatly influenced by the others. Much of the effort of all groups has gone into tweaking and tinkering with standards authored by other groups or the modifications made by other groups.

Eventually, to achieve authority, the standards must be submitted to an organization with the authority to accredit and promulgate them. The first stop along this route for most standards will be the IEEE. Eventually standards may go onto to become ISO standards.

By the way, IEEE is always pronounced “eye-triple-E and never “Eye-E-E-E.” It stands for the Institute of Electrical and Electronics Engineers, but no one ever calls it that. Don’t embarrass yourself by doing so.

Two parallel standards efforts are worth noting. One is the ASTD Certification Institute’s E-Learning Courseware Certification program, which evaluates not the technology of e-learning but the quality of its content. The other is that of underlying technologies such as HTML and XML, which are governed by the World Wide Web Consortium, known as the W3C for short. The W3C also promotes standards for accessibility of Web content.

There are certainly more standards organizations, but these are the most influential ones and the ones most likely to publish standards that will change the world.
Packaging standards

Packaging standards specify how to bundle the separate files that make up a lesson, course, or other unit of content. They are necessary to ensure that all the hundreds or thousands of files are included and installed at the right location.

What is a packaging standard?

What exactly is a packaging standard?

It is way to specify or catalog the content of a course or other unit of learning content. The package includes the course definition, HTML files, images, multimedia, style sheets, and everything else down to the smallest icon.

A packaging standard specifies an organization scheme for a module or course so that it can be imported into a learning management system and so that the learning management system can display a menu for the course and launch components chosen by the learner.

A packaging standard implies techniques to move courses and modules from one learning management system to another, without having to recatalog or reorganize their parts.

Finally, a packing standard provides a way to bundle all the separate files and URLs into a single file for easy transport.

What packaging standards?

What packaging standards are available? Several similar packaging standards have evolved.

- AICC Course Structure File
  - Complex flows possible.
  - Difficult to implement.
  - Little reuse of components

- IMS Global Consortium IMS Content & Packaging specification
  - Easier to implement.
  - Only hierarchy for now.

- SCORM Packaging Standard
  - Virtually same as IMS Content and Packaging specification

The earliest was the AICC Course Structure File. It is a rich and complex standard. With this standard, designers can designate complex flows through content. However, many developers complain that this standard is hard to implement and that it does not encourage reuse of already-defined lower-level modules.
In contrast, the IMS Content and Packaging specification is simpler and more constrained. It is easier to implement, but only hierarchical courses are possible in the current version of this standard.

SCORM originally defined its own packaging standard, but in Version 1.2, SCORM adopted the IMS Content and Packaging Standard virtually intact.

### IMS Content and Packaging Std.

Since both SCORM and IMS use the IMS Content and Packaging specification, let’s take a closer look at it.

The core of the Content and Packaging Standard is a manifest or packing slip for the package. This manifest must be named imsmanifest.xml, and as its extension indicates, it follows the rules of XML for internal structure and formatting.

Within this file are four main sections. The Meta-data section records specific information about the module. The Organizations section is the actual inventory of content. It is essentially a table of contents for the module. It refers to specific resource descriptions and to sub-manifests, each of which is further detailed in its own section. The resource descriptions occupy the third section of the manifest, called Resources. These descriptions point to local files that are included in the package and to external files (i.e. URLs) on the Internet. Sub-manifests completely describe included packages. Each sub-manifest has the same Meta-Data, Organizations, Resources, and Sub-manifests sections as the main manifest. Manifests can thus include sub-manifests which include further sub-manifests. This process of inclusion allows assembly of courses and other high-level components from individual lessons, topics, and other lower-level knowledge objects.

The specification also provides techniques to wrap the manifest and files up into one physical package. The recommended file format for consolidating separate files is PKZIP Version 2.04g (.zip), but a Java archive (.jar) or cabinet (.cab) file could also be used.
Help meeting packaging standards

Hand-crafting the XML coding of the IMS Content and Packaging manifest is a time-consuming and error-prone process. Fortunately tools exist to help with the task. Let’s look at some tools for creating an IMS manifest.

Microsoft’s eLearn subsite (www.microsoft.com/elearn/) provides several tools for implementing the IMS Content and Packaging specification and for displaying IMS packages. Microsoft calls its toolkit LRN, which is pronounced “learn” and stands for Learning Resource iNterchange. Within this toolkit are three tools helpful in constructing IMS packages. The LRN Editor can be used to create and modify package manifests. The LRN Validator tests a manifest for compliance with the IMS specification and XML structuring rules. The LRN Converter for FrontPage lets authors use FrontPage to assemble their module as a Website and then run the converter to generate the corresponding IMS manifest.

Macromedia, on their Dreamweaver exchange (www.macromedia.com/exchange/dreamweaver/) provides access to dozens of extensions to their Dreamweaver tool. Some of these extensions are provided by Macromedia and some by third parties. There you will find two extensions by Tom King: Manifest Maker and Manifest Maker+. Both of these extensions enable Dreamweaver to create an IMS manifest for a course authored in Dreamweaver.

Some learning management systems provide commands for packaging courses for exchange with other learning management systems. Once you have assembled the course in your LMS, look for an “Export as IMS package” command.

Example: Microsoft LRN Editor

Let’s look at what it takes to create an IMS package. We’ll do so with Microsoft’s LRN Editor. The process is relatively intricate, though each step is simple enough.

1. Create and test the course, lesson, or other module. Make sure you have all the necessary files.

2. Download the LRN Toolkit from www.microsoft.com/elearn/ and install it.

3. Use the LRN Editor to enter the data necessary for the required sections of the manifest. You will need to enter file names, descriptions, and other data.
4. Save the top-level manifest as imsmanifest.xml.

5. To test your package, import it into the LRN Viewer. Make sure all the components appear where you specified.
Example: Manifest Maker+

Manifest Maker is a free extension for Dreamweaver that automatically generates an IMS Manifest for a Website authored with Dreamweaver. Here’s how you might use it:

1. Download and install Manifest Maker or Manifest Maker+ from the Macromedia site. Go to www.macromedia.com/exchange/dreamweaver and view extensions in the learning category. Manifest Maker+ is more up to date, but its results may not be compatible with as many other tools as the earlier Manifest Maker. Download and install the extension according to instructions from Macromedia.

2. Build your module as a Website entirely within Dreamweaver. Make sure Dreamweaver tracks all HTML files, script files, style sheets, graphics, and all other media.

3. Choose the Make Manifest command in Dreamweaver.

4. Supply the requested information and save the results.

5. To test your package, try importing it into Microsoft’s LRN Viewer or into an IMS-compliant learning management system. If you cannot get the package to import and display correctly, try to identify and fix the problem. Keep in mind, though, that the problem may be an inconsistency in the way tools interpret the standard rather than any mistake on your part.

LMS-module communications standards

Communications standards define a language whereby the learning management system can start up modules and communicate with them. In this segment, we will consider what the learning management system and modules need to communicate, what communications standards have been proposed, how they work, and what we must do to comply with them.
What needs to be communicated?

What do the learning management system and learning module need to communicate? What could they possibly have to say to one another?

The LMS might want to start the module and have the module acknowledge that it is running. The module might ask the name of the learner so it can personalize responses, or the module might report back how much of the module the learner has completed. For tests, the LMS needs to record the scores. And the LMS needs to know when the learner has completed and closed a module.

Keep in mind that none of these communications needs is new. We never noticed them in traditional CBT modules because the communication was within a single integrated piece of software running on a single machine, rather than among distributed components running across a network.

What communications standards?

What communications standards should you consider? Two main organizations have issued communications standards that have been implemented in learning management systems.

AICC has two related standards, called AGRs, which stands for AICC Guidelines and Recommendations. AGR006 covers computer-managed instruction in general. It applies to disk-based, mainframe-based, and Web-based e-learning. AGR010 specifically addresses Web-based computer-managed instruction. It is a short specification that refers to AGR006 for most of its content.

ADL’s SCORM standard includes a Runtime Interface (RTI) specification that covers communication between learning management systems and sharable content objects, which is SCORM’s terms for a module.
AICC’s communications standards were originally written for disk-based systems. The module and management system exchanged data by writing and reading a single file on the disk. With e-learning, though, the learning management system and learner may be on separate computers connected by a network. A new scheme was needed to transport data between them. Here’s how that scheme typically works:

The course module or learning object runs in the course window. This module is called an assignable unit in AICC parlance. It communicates with the LMS through a secondary window containing an invisible HTML form. This secondary window may be another frame in an overall frameset that contains the course window, or it may appear as an independent window tucked underneath the main course window. Perhaps you have noticed a second window created when you launched a module. And you may have noticed rude messages if you closed it before completing the module. That’s because closing the window severs the communications link between module and LMS.

The module communicates with the LMS by writing data into hidden fields on the form in the secondary window and then submitting this form to the server. The form uses the HTML Post method to send the data back to the LMS. The LMS replies by replacing the content of the secondary window with an identical form made up of hidden fields. Some of these fields contain data that the course module can read. This somewhat Byzantine form of exchange is called HACP, which stands for HTTP AICC Communication Protocol.

Fortunately for course developers, the required windows and hidden form are provided by the LMS.
Help meeting AICC requirements

Tool vendors are offering help in building content that can communicate with management systems.

The Knowledge Track feature built into the CourseBuilder interactions for Dreamweaver (www.macromedia.com/exchange/dreamweaver/) lets designers have their test questions report scores back to an AICC compliant system. The course author just clicks a checkbox on a dialog and Dreamweaver adds the necessary frames and scripting.

Similar features are available in ToolBook (www.click2learn.com) and Trainersoft Professional (www.trainersoft.com) to communicate with AICC-compliant systems.

Example: Knowledge Track

The CourseBuilder extensions for Macromedia Dreamweaver can add test questions and other interactions to HTML pages. Interaction types include true-false questions, multiple-choice questions, and drag-and-drop activities. The Knowledge Track option within CourseBuilder instructs Dreamweaver to insert the code necessary to communicate scores and other data to a learning management system that supports the AICC communications standard.

To use this feature:

1. Download and install the CourseBuilder extension for Dreamweaver. You can obtain it for free from www.macromedia.com/exchange/dreamweaver/.

2. Insert and customize an interaction.
3. On the General tab of the interaction’s dialog box, select the Knowledge Track option.

![Interaction dialog box]

4. On the Action Manager tab, you can use tracking behaviors to exchange information with the learning management system.

![Action Manager tab]

5. Save and test your module.

![Test module window]

Though a bit complex, this procedure is still much simpler than hand-coding compliance.

**SCORM Runtime Interface**

The SCORM Runtime Interface specification is relatively simple for course developers to implement but still requires a precise structure of windows and frames. This is how it typically works. Within the browser is a frameset defined by the LMS and within that, a content window where resides the module, called a sharable content object, which is SCORM’s terminology for a learning module or knowledge object.
Communication with the LMS is handled by a software component called an API adapter. API stands for application programming interface and refers to the part of the LMS that external programs can control. The API adapter may be a Java or ActiveX component. It is provided by the LMS vendor.

But how does the module communicate with that API adapter? It does so by calling JavaScript functions defined in a file called APIWrapper.js. This script library is referenced from the parent window so that its functions are available from all the windows it contains, such as the one containing the learning module. Each function tells the API adapter to get data from the LMS or send data to it.

**The SCORM phrasebook**

The SCORM communications standard prescribes a rich language whereby the LMS and module can communicate. Let’s look at four of the most important SCORM commands: LMSInitialize, LMSFinish, LMSGetValue, and LMSSetValue. Consider this a phrase-book of the SCORM language.

**SCORM phrase: LMSInitialize**

One of the first commands a module may issue is LMSInitialize. It says to the LMS, “I’m starting up. Start your clock and begin tracking me.” This command would be issued at the beginning of each learning module. For multiple-page modules, you would issue this command only at the start of the first page. Some tools automatically put this command on each page by default, so you may have to remove it manually for multi-page modules.
Standards for e-learning

The SCORM command LMSFinish marks the end of a module. It says to the LMS, “I’m done. You can stop the clock and cease tracking me.”

You would issue this command at the end of each learning module. For multi-page modules, you would issue this command only at the end of the last page.

Together LMSInitialize and LMSFinish can implement rudimentary tracking. With these two commands, the LSM can track which modules the learner has visited and how long the learner spent in each module.

Some vendors of courseware put a single LMSInitialize command at the beginning of their course and an LMSFinish command after the final exam—and claim SCORM compliance.

**SCORM phrase: LMSGetValue**

The LMSGetValue command enables the module to request information from the learning management system. For example, LMSGetValue(“cmi.core.student_name”) says to the LMS, “Who’s taking me? Send me the name of the student who launched this module.”
This is just one example of the kind of data LMSGetValue can retrieve from the LMS. The part of the command within parentheses determines which item of data the module is requesting. The vocabulary of available items is determined by another part of the standard called the data model.

The LMSGetValue command can be used anywhere within the module between the LMSInitialize and LMSFinish commands and can be issued as many times as necessary within the module.

The data retrieved from the server can be used in displayed messages, in calculations, and in making decisions about how the course should branch and continue.

SCORM phrase: LMSSetValue

Just as a learning module can read data from the LMS with the LMSGetValue command, it can send data to the LMS with the LMSSetValue command.

For example, the command LMSSetValue(“cmi.core.lesson_status”, “completed”) tells the LMS that the learner has completed the current module and thus the LMS should record the module’s status as “completed.” The first part within parentheses is the data item the LMS should set and the second part is the value it should record for this item.
The LMSSetValue command can be used to send a wide variety of data to the server. The exact items and their formats are determined by another part of the standard called the data model.

**SCORM Runtime Data Model**

The SCORM runtime data model sets the vocabulary that the LMS and learning module use to talk to one another. Items like “cmi.core.student_name” and “cmi.core.lesson_status” are defined items in the vocabulary understood by the LMS and specified in the SCORM Runtime Data Model specification.

Note, not all LMS vendors support all the items in the data model and some LMS vendors define their own non-standard items.

**Help meeting SCORM requirements**

For SCORM communications, several LMS vendors, such as Pathlore (www.pathlore.com) and Integrity (www.ielearning.com) offer a SCORM Runtime Toolkit containing the JavaScript functions and API adapter necessary to add SCORM commands to HTML pages.

An extension for Dreamweaver, called the SCORM RTI Minimal Code (www.macromedia.com/exchange/dreamweaver/), lets authors add basic SCORM commands to their Web pages within Dreamweaver. There are also two similar extensions for Flash (www.macromedia.com/exchange/flash).
Example: SCORM in HTML

Adding SCORM communications to the HTML pages of a module involves adding the JavaScript commands and API adapter needed to communicate to the LMS. Let's see how you might go about this.

1. Obtain the JavaScript functions (APIWrapper.js) needed to communicate with the LMS. You can probably download these from the Website of the vendor of your LMS or from www.adlnet.org.

2. Create your content pages.

3. Link to the JavaScript functions within the <HEAD> section of each HTML page.
4. Within each page, add functions to communicate with the LMS.

5. Save and test your modules with the LMS.

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**Metadata standards**

Metadata is data about data. For e-learning, metadata describes courses and other modules. Metadata standards provide ways to describe learning modules so potential learners can find the module they need.

**What is metadata?**

Still unclear as to what we mean by metadata? Perhaps this example will help. This handsome fellow is Batu. Batu is a dog. Batu has a city license and has been vaccinated for Rabies. He also has a phone number, a postal address, and an e-mail address. But to look at him you would not know any of these things.
metadata = informative labeling

Around Batu’s neck is a collar from which hang several tags. These tags contain that information about Batu. These tags are his metadata. Batu would be the same dog without the metadata, but the metadata helps someone identify and appreciate him.

Metadata is nothing mysterious. It is simply informative labeling.

More examples of metadata

Metadata is pervasive in our daily lives. Perhaps you have consulted the tables of nutritional ingredients on food packages. Or maybe you have judged a book by its cover. Or its title page, dedication, copyright notice, table of contents, index, or colophon. Have you ever read a movie poster or stayed to read the credits at the end of the movie?

If you have done any of these things, you have used metadata. Can you think of other examples of metadata that you routinely use to guide your decisions?
What does metadata do for us?

What does metadata do for us as developers and consumers of e-learning? Metadata makes e-learning content more useful to buyers, learners, and designers.

Metadata provides a way of describing courses, lessons, topics, and content modules that is consistent in format and in items recorded.

Such descriptions can be compiled into catalogs that can be electronically searched.

Sophisticated searches are possible. With metadata we are not limited to simple word matches. We could search for all Japanese-language courses about Microsoft Word that are under two hours in length and find just what we want, without having to sort out the Microsoft Word documents about the Japanese language.

Metadata enables learning management systems to automatically compile catalogs of all the courses, lessons, and other modules they offer.

Metadata can also help developers find content they can license or borrow rather than developing it from scratch.

Can you think of some things metadata could do for you?

What metadata standards?

What metadata standards should we consider? We have three main candidates:

IEEE Learning Object Metadata

IMS Learning Resources Meta-data Specification

SCORM Metadata Standards

IEEE’s Learning Object Metadata standard published by their Learning Technology Standards Committee, the IMS Learning Resources Meta-data Specification, and the SCORM Metadata standards. All three are quite similar and may eventually coalesce to a single standard.

You may be asking, “Is metadata spelled with a hyphen or not?” The answer is it depends on whose standard you are considering. IMS spells it meta-hyphen-data while most of the rest of the world omits the hyphen.
Standards for e-learning

My favorite IMS Meta-data items

Metadata standards specify dozens or hundreds of required and optional items. Some are absolutely necessary, and others are embarrassingly obscure. By way of example, let me point out some of my favorite metadata items from the IMS specification. On the left are the names and numbers of these items and on the right are their values for a particular course.

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2 title</td>
<td>Introduction to Gantt Charts</td>
</tr>
<tr>
<td>1.4 language</td>
<td>en-US</td>
</tr>
<tr>
<td>1.5 description</td>
<td>Overview of using Gantt Charts in business.</td>
</tr>
<tr>
<td>1.6 keyword</td>
<td>Gantt chart, project management</td>
</tr>
<tr>
<td>1.8 structure</td>
<td>Hierarchical</td>
</tr>
<tr>
<td>1.9 aggregation level</td>
<td>4 (course)</td>
</tr>
<tr>
<td>2.1 version</td>
<td>1.1</td>
</tr>
<tr>
<td>4.1 format</td>
<td>text/html, image/gif, application/x-shockwave</td>
</tr>
<tr>
<td>4.2 size</td>
<td>1200000 (bytes)</td>
</tr>
<tr>
<td>4.3 location</td>
<td><a href="http://www.GanttGroup.com/courses/rgc.htm">http://www.GanttGroup.com/courses/rgc.htm</a></td>
</tr>
<tr>
<td>4.4 requirements</td>
<td>Browser: Internet Explorer, 4+</td>
</tr>
<tr>
<td>4.7 duration</td>
<td>02:30:00</td>
</tr>
<tr>
<td>6.1 cost</td>
<td>no</td>
</tr>
</tbody>
</table>

The title records the official name of the course. Language specifies both the language family (en for English) and the variant (US for American English). The description includes a textual catalog entry for the course, and keywords record terms under which to list the course in an alphabetical index. Structure records the primary organization of the course: sequential, hierarchical, and so forth. Aggregation level specifies the size of this unit. A whole course is level 4; a lesson is level 3, and individual topic is level 2. Format records the file formats used in the course. These are stated as MIME type and subtype. Size is the total size of all the files of the course, expressed in bytes. Location records the URL where consumers can access the course. Requirements list things such as the browser and operating system required to experience the course. Cost records whether the course charges a fee or is free.

Other items may be important to you, but you get the idea of the type of information recorded in metadata.

Help meeting metadata standards

Metadata must be precisely formatted as XML, not an easy task to do by hand. Fortunately standards bodies and vendors are making available tools for constructing standards-compliant metadata.
Standards for e-learning

IMS offers a Developer’s Toolkit developed by Sun Microsystems. You can download it from www.imsproject.com.

ADL offers the SCORM Metadata Generator, which you can download from www.adlnet.org.

Example: Making metadata

Let’s look at an example of creating a metadata record for a product. For this example we use the metadata generator from ADL.

1. Download the tool from www.adl.org
2. Start it up.
3. Enter values for required items and items of interest to you.
4. Save the record as an XML file.

You may want to view the metadata, just to see how much work you saved yourself over having to hand-code the XML.

Quality standards

Quality standards concern the design of courses and modules as well as their accessibility by those with disabilities.

Quality standards guide decisions

Quality standards help consumers select products. Quality standards are common in manufacturing, commerce, and even education. Well known quality standards include ISO 9000 standards for manufacturing, the Good Housekeeping magazine’s Seal of Approval, Underwriters Laboratories approvals, the Scholastic Aptitude Tests, and the crash-safety ratings from the Insurance Institute for Highway Safety.
Consider what all of these standards promise—and what they do not promise. They promise that items meeting the standard achieved some minimal level of performance. They do not guarantee that the items can never fail. To use quality standards, we must understand that they increase the odds of success, but can never ensure success. Every year thousands of students with high SAT scores flunk out. And safe drivers survive with automobiles rated as marginal by the Insurance Institute. Quality standards inform our decisions but should not make them for us.

**E-learning design standards**

The primary design-quality standard for e-learning is the E-Learning Courseware Certification Standards from the ASTD Certification Institute. The Certification Institute will certify that e-learning courses comply with composite standards covering user-interface design, compatibility with standard operating systems and tools, production quality, and instructional design.

[Image: E-learning design standards](www.astd.org/ecertification/)

**Accessibility standards**

Accessibility standards concern how to make jobs, buildings, and information technology accessible to those with common disabilities, such as impaired vision or hearing, lack of eye-hand coordination, or reading disabilities. There are no explicit accessibility standards for e-learning alone; however, e-learning falls under accessibility standards for information technology and Web content.
**Section 508 of the Rehabilitation Act**
Information technology purchased by U.S. Federal agencies must be accessible by those with common disabilities.
www.section508.gov

**Web Content Accessibility Guidelines**
Goal is to “make all Web content accessible to people with disabilities”
www.w3c.org

The most important accessibility standard for information technology is Section 508 of the U.S. Rehabilitation Act, or more precisely, the 1998 Revision of Section 508 of the Rehabilitation Act of 1973. This law requires that information technology, including e-learning, purchased by U.S. Federal agencies must be accessible by those with common disabilities.

The World Wide Web Consortium (W3C) has launched a Web Accessibility Initiative. The W3C has published Web Content Accessibility Guidelines. Their goal is to “make all Web content accessible to people with disabilities.” This standard will cover all Web-based training directly and disk-based training by analogy.

**Who has which standards?**

Which group offers which standards? To test your memory, connect each organization on the left to the type of standards it offers on the right. How many of them can you connect?

<table>
<thead>
<tr>
<th>Match the organization with its standards.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE LTSC</td>
</tr>
<tr>
<td>IMS</td>
</tr>
<tr>
<td>ADL SCORM</td>
</tr>
<tr>
<td>W3C</td>
</tr>
<tr>
<td>AICC</td>
</tr>
<tr>
<td>ASTD</td>
</tr>
</tbody>
</table>
Other standards

Packaging, communications, metadata, and quality are the main standards for e-learning, but other important standards are on the way. What other standards are coming? Let’s gaze into the crystal ball.

IMS is busy developing standards for other aspects of interoperability. High in priority among these are standards for test questions. Test questions developed in one LMS often cannot be transferred to another LMS. The IMS Question and Test Specification seeks to define generic ways of specifying tests that can be realized in many different systems. This and other IMS specifications are available at www.imsproject.org.

Learning management systems often need to exchange data with other corporate systems such as Enterprise Resource Planning (ERP), Human Resources, and Customer Relationship Programs (CRP). The IMS Enterprise Information Model seeks to define formats for exchanging administrative data among such systems.

Likewise, administrators often spend much time entering information about the learner into multiple learning management systems. The IMS Learner Information Packaging specification attempts to define a common format for information about learners. Descriptions in such formats could then be freely exchanged among systems.

Can you think of other areas that would benefit from standards?
CAUTIONS

Despite much progress, there is still a lot to be done and many barriers to overcome before we realize the promise of standards. Realistic views of standards are necessary if we are not to be hoodwinked and are to use standards wisely.

Beware claims of compliance

One problem with any standard is how to tell who meets the standard and who does not. Conversely, those who meet the standard face the problem of proving to skeptical buyers that they meet the standard.

Further complicating the matter is the vague and varying terminology used to refer to items that purport to meet the standard. Some claim to be compliant, certified, consistent, conforming, conformant, or just to support the standard.

Such claims seldom tell us anything useful. We are left to ask some probing questions. We should ask exactly what standard, guideline, or specification the item claims to meet. Many standards include multiple parts or specifications. For which is compliance claimed?

Standards are evolving at Internet speed. Version 1.2 may differ from Version 1.1 of a standard. We must ask what version of the standard an item claims to meet.

Some vendors claim compliance with a standard when they only meet a few of its provisions. Some standards groups define a minimal set of requirements for claiming conformance. However, the minimal requirements may be insufficient for your purposes. Be sure to ask about the degree to which the item meets the standard.

How can a vendor’s claim be verified? Does the standards group authenticate or certify compliance? Or is this task done by third-party evaluators? Or, are the vendor’s claims all you have to go on.

When it comes to claims of compliance, caveat emptor.

Which claims are meaningful?

Many claims about compliance with standards tell us little or nothing. To see how confusing such claims can be, see if you can identify which, if any, of these claims tell you something useful?
Standards for e-learning

Which of these claims tell you something useful?

☐ “We meet all industry standards.”
☐ “We’re fully AICC compliant.”
☐ “Our product is certified by IMS.”
☑ “We meet SCORM 1.1 RTI minimal requirements.”
☐ “Our WBT meets AGR006.”

Let’s look at the claims one at a time. The first one, which claims to meet all industry standards, is too broad to be credible. Perhaps there is some product that meets all standards, but it is probably so internally inconsistent you would not want it.

The second claims to be fully AICC compliant. It too may be true, but it is often used by a vendor who meets only one of the several AICC Guidelines and Recommendations. It is unlikely any tool or course meets all AGRs simultaneously.

The third claim that a product is certified by the IMS is false, simply because IMS does not itself certify compliance with its standards.

The fourth claim of compliance with the minimal requirements of Version 1.1 of the SCORM Runtime Interface specification is credible and meaningful enough, though the minimal requirements are so minimal we may not find much value in this statement.

The final claim that someone’s Web-based training meets AGR006 is confusing, since AGR006 primarily covers computer-based training rather than Web-based training, which is covered in AGR010.

MinE STDS R hrd stand/2

Many standards are hard to understand. Some seem encrypted in a rightfully forgotten dead language.

In some standards, it is not clear which provisions apply to learning management systems, which to authoring tools, and which to courseware.

Arcane terminology abounds. We routinely run into phrases like “semantic density.”

And terminology varies radically from standard to standard, even ones from the same organization. What is called a lesson in one standard is called a block, an SCO, an assignable unit, or a Level 3 aggregation unit in another.
For many standards, interpretation is required for use in the real world. For example, it is unclear how some of the standards are to be applied to synchronous e-learning or to blends of classroom and e-learning. Interpretations are not always consistent.

Another point of ambiguity is in what aspects of the standard are real and which are merely predictions. You must read carefully for phrases such as “in future versions,” “may be included later,” and “are under discussion.” Although previews of coming attractions are interesting and sometimes helpful, they can obscure the boundaries of standards as written.

A big symptom of the confusing nature of the language of standards is what I call “A by w times A to the nth.” That is, acronyms within acronyms within acronyms within acronyms.

**AWA (Acronyms within acronyms)**

Standards are rife with acronyms within acronyms. Here’s an example. AICC specifies a method of communication between a learning module and the learning management system. This method of communications is called HACP.

HACP stands for HTTP (an acronym) AICC (another acronym) Communication Protocol. AICC stands for Aviation Industry CBT (an acronym) Committee. CBT stands for Computer-Based Training. HACP is thus an acronym within an acronym within an acronym.

Plus, when you try to pronounce it, you sound like you are clearing your throat.

I worry whether people can follow standards based on three levels of verbal indirection.

**Standards can do real harm**

Standards can do real harm. Some negative consequences of standards go beyond inconvenience. The crude or mercenary application of standards can do more harm than good. What may be some of the negative side effects of standards?

Standards can stifle creativity and innovation. They limit the structure, flow, and content of courses. Most require a highly conventional hierarchical or linear
Standards for e-learning

course. Rich simulations may be more effective but harder to make comply with the standards.

Designers may scale down their ideas to fit the defaults of standards-compliant systems. Lacking time to master complex tools, many course authors may take the path of least resistance.

Compliance increases development costs. Time and effort put into complying with standards may reduce the time available for ensuring the quality, coverage, or effectiveness of the course.

Standards are overused as marketing ploys designed to limit competition. Organizations that produce hundreds or thousands of generic courses can spread the costs of compliance over more courses than can smaller producers of high-quality courses. Vendors of compliant but instructionally inferior courses may lobby naïve buyers to require compliance in their requests for proposals.

Can you think of other dangers posed by misuse of standards?

Few pure implementations

Few pure implementations of standards exist. There are a number of reasons. Most of them have their roots in the basic animal behavior exhibited each time a group of dogs encounters a fire hydrant. Each has to leave his mark. Standards groups are like dogs.

For one thing, there are few consensus standards. Standards groups pass standards back and forth. No group seems to be able to adopt another group’s standard unchanged. Instead, each must make at least minor changes. Though minor, these changes mean that adopters of the standard must still choose which to follow.

Vendors muddy the waters, too. Many implement only subsets of the standards. Unfortunately they do not implement the same subset so their products are not compatible with other products. The same goes with data models. Even if a tool can communicate with another, it cannot understand what the other is saying.

Vendors may add extensions to standards that give the vendor a competitive advantage but that reduce interoperability. Such features are sometimes called black-hole features because once content developers start using them, they cannot easily move their material from that vendor’s tool to another vendor’s tool.
SET YOUR STANDARDS STRATEGY

Once you have considered the various aspects and choices of standards, it is time for you to set your standards strategy. It’s time to make standards part of your work.

Attitudes toward standards

The first step in wisely incorporating standards into your work is to decide the proper attitude toward standards. This is not a black-and-white choice. A spectrum of attitudes is possible toward standards ranging from anti-standards to pro-standards.

On the anti-standards end of the scale are those who never follow standards. Someone with this attitude not only ignores standards but avoids products labeled as following standards.

Someone less severe in opposition to standards might follow standards but only if required to by a customer, client, or boss—and only if someone else picks up the costs of compliance.

Toward the middle of the scale might be someone who follows standards when they prove their value to the project at hand.

Toward the pro-standard end of the scale are those who adopt standards as soon as the standards gain a modicum of acceptance and as soon as they can do so without severe risk.

On the pro-standards end of the scale are those who begin following standards as soon as they are proposed—even before the standards are officially adopted by the proposing organization.

For consistency and effectiveness, you should pick your location along this scale. You will probably start somewhere in the middle and over time move in one direction or another as your experience or need to be a leader dictates.
Our recommendations

I’d like to summarize by offering some advice based on our experience as consultants. We feel this advice offers a practical approach. True, you may not want to be practical. But in any case, here are our recommendations.

- **Proactively procrastinate.** If you don’t need standards, wait until they mature further. Standards will grow simpler and more clearly expressed. Better tools to automate compliance will be developed.

- **Do your own validation testing** of content with a LMS. Official test procedures do not test every possible combination of variables. Test your LMS with content of the type you plan to use.

- **Demand reliable, point-and-click tools.** Hand-coding is time-consuming and error-prone.

- **Ask vendors exactly what they support.** Do not accept vague claims. Insist on knowing exactly what provisions of which version of which specification the vendor supports.

- **Worry more about getting content out of a LMS than getting it into one.** Vendors have a competitive advantage to making it easy to get material into their system but not to make it easy for you to move material from their system to a competing system. Check out the export command just as carefully as the import command.

- **Design truly modular instruction.** Just following technical standards does not make training content modular. Standards give us reusable, modular containers. It is what we put into those containers that determines whether the training content is useful and reusable.

Homework: Pick external standards

Now it is time for you to plan your strategy regarding standards. It is a three-step process:

1. Visit the Websites for the standards groups.
2. Which standards apply to your project?
3. How will you incorporate these standards into your work?
Standards for e-learning

(1) Visit the Websites for the various standards groups. Read their descriptions of the standards. Read the standards themselves. Download and experiment with tools for creating standards-compliant content.

(2) Which standards apply to your project? Which can add value to the finished product? Which can make your workflow more efficient? Which will allow you to reuse components?

(3) How will you incorporate these standards into your work? Will you purchase tools that follow standards or make following standards easier? Which aspects of which standards will you follow first? Will you build standards into the templates and scripts you use in constructing content? Will you require standards compliance in your request for proposals from vendors?

Think about how you will make standards work for you, your project, and your organization.
STANDARDS GROUPS

This section lists organizations developing and publishing standards.

IEEE’s LTSC (P1484)

IEEE’s Learning Technology Standards Committee develops technical standards, recommendations, and guidelines for:
- Tools
- Technologies
- Design techniques

Many working groups, but few standards yet

http://grouper.ieee.org/LTSC/

Advanced Distributed Learning

ADL’s primary focus is SCORM, Sharable Content Object Reference Model.
- Packaging standard for representing course contents and organization
- Runtime specifications for communicating with learning management systems
- Metadata standards for labeling content for searching engines

www.adlnet.org/
Standards for e-learning

Aviation Industry CBT Committee

AICC guidelines define how courseware from different vendors using different tools can be used interchangeably.

- AGR006 computer Managed Instruction (CMI)
- AGR007 Courseware Interchange
- AGR010 Web-based computer Managed instruction (CMI)

IMS Global Learning Consortium

IMS has produced influential standards on:

- Metadata tagging (IMS Learning Resources Meta-data Specification)
- Content Packaging (IMS Content & Packaging specification)
- Test questions (IMS Question & Test Specification)
- Administrative data interchange (IMS Enterprise Information Model)
- Learner information (IMS Learner Information Packaging specification)

Learning Resources Interchange

LRN is Microsoft’s implementation of the IMS Content & Packaging Specification. Download the specification and toolkit from Microsoft.

www.microsoft.com/elearn/

www.aicc.org/
Standards for e-learning

World Wide Web Consortium

- HTML
- HTTP
- XML
- Cascading Style Sheets (CSS)
- Document Object Model (DOM)
- Accessibility
- Synchronized Multimedia Integration Language (SMIL)
- Other underlying Web technologies

ASTD Certification Commission

The ASTD Certification Commission will certify e-learning courseware.
Certification will cover instructional design, user interface, consistency, and production quality.

ARIADNE Foundation

The ARIADNE Foundation will “exploit and further develop ... tools and methodologies for producing, managing and reusing computer-based pedagogical elements and telematics supported training curricula.”
PROMETHEUS

“PROMETHEUS is an open initiative … under the sponsorship of the European Commission with the aim of building a Common Approach to the Production and Provision of e-learning Technologies and Content in Europe.”

ALIC

The Advanced Learning Infrastructure Consortium, based in Japan, is a cooperative effort of industry, government, and academia to develop and apply standards for learning technology.

ISO JTC1 SC36

International Organization for Standardization
Joint Technical Committee 1 – Information Technology
Subcommittee 36 – Learning technology
William Horton


William Horton Consulting

For over 12 years, the two-person team of William and Katherine Horton has helped organizations plan, design, justify, and perfect e-learning initiatives.
