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Peak Performance and Learning

An Introduction to Learning Technology Standards

Standards can play an important part in enterprise learning, from the development of learning content to how it interacts with database management applications. This documents provides an overview of the standards that affect learning technologies and advice of how to work with vendors of standards-affected technologies.

GeoMetrix
Data Systems Inc.

1-800-616-5409
(250) 361-9300
info@trainingpartner.com
www.trainingpartner.com

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Corporate Head Office:
Victoria, BC Canada

Introduction

Standards can play an important part in enterprise learning. There are two main purposes for industry standards when it comes to technology. The first is to ensure a certain level of functionality for processes and security. The second is to ensure compatibility between multiple technologies so that different systems will work together. In most cases, the standards developed for learning technologies apply to the development of learning content and how that content interacts with database management applications, specifically Learning Managements Systems (LMS) and Learning Content Management Systems (LCMS).

When both the LMS or LCMS and the content adhere to the same set of standards, information can be passed between the technologies. For example, a Web-based training course that is developed using the same set of standards used in an LMS can be launched and tracked using that LMS without any loss of data. The information output from the course, including the results of an online test or assessment, can be automatically recorded into relevant fields in the LMS. This information is then available in the student's record for transcript or certification purposes or for inclusion in a class grading report, and so on.

Over the past few years several organizations have developed standards that are related to learning technologies. Some of the specifications issued by these organizations are general and constitute a set of guidelines or practices for the development of learning technologies. Other specifications are more rigid and have testing and certifications associated with them.

Most of the standards being developed are specific to electronic learning: computer-based or Web-based training courses. While these industries are fairly new, and the standards themselves even newer, there has already been turn-over in the standards bodies that oversee them. Some standards bodies have been superceded by other bodies, and some standards have already become outdated.

With such new technologies, these changes should probably be considered growing pains, rather than disorder and confusion in the industry. But organizations should be aware that the standards for learning technologies are still evolving and nothing is set in stone. As old technologies become obsolete and new technologies are created, changes to standards will follow, although probably significantly more slowly than the technology changes themselves.

One of the reasons for the slowness of standards development, is that for a set of specifications or guidelines to become 'standards,' the industry must accept and adopt them — and this takes time. Developers of technology must incorporate the specifications into their products. To ensure compliance with the standards, the products must be tested (preferably by an independent lab) and the results logged.

In the learning technologies industry, different specifications apply to different technologies and some standards consist of different levels of specifications. If organizations wish to use multiple technologies together in their enterprise learning system, they need to ensure that the tools they have chosen comply with current industry standards at the correct compliance level. Learning organizations should purchase technology that is designed to meet or exceed all the relevant standards for the specific technologies, whether it is web-based courseware or a learning management system.

AICC

Courses that are AICC-compliant have been designed to follow the Aviation Industry CBT Committee (AICC) standards. These standards are documented and published on the AICC website (www.aicc.org). Many commercial courseware vendors create their electronic courseware using AICC specifications. Corresponding standards in LMSs and LCMSs ensure that these courses can be launched and the results tracked from these compliant systems.

If learning product vendors state that they are AICC-certified, it means that they have undergone a formal testing process performed by independent test labs through the Aviation Industry CBT Committee. The individual components of an application are tested against a published test suite and the results are published on the AICC web site.

SCORM

The SCORM standard is based on the published AICC-B standard. Many vendors consider SCORM and AICC-B to be interchangeable. Similar to AICC, SCORM maintains its own test suite for helping to ensure compliance of courseware and Learning Management Systems to the SCORM standards. Output from these logs is considered proof of compliance. Also similar to AICC, there are test labs that will independently verify compliance.

AICC and SCORM represent the two major standards for launching and tracking of web-based content within Learning Management Systems (LMSs). Many courseware and LMS vendors support these standards which allow results from the courseware to be tracked within the LMS.

However, there is often a lot of confusion over these standards. This is mainly due to the issue that anyone can *claim* to be compliant and that even courseware that is minimally compliant may not operate correctly in the real world.

This document provides tips for ensuring that courseware vendors are both compliant and that courseware operates in real-world scenarios.

Compliance Today

As noted above, both the AICC and SCORM are published standards that permit LMSs to import, launch and track results returned by courseware.

In theory, any compliant LMS can launch and track results from any compliant courseware. However, in practice, this is often not the case. There are several reasons for this.

Non-Enforced Standards

Any vendor can claim to be compliant with either the SCORM or AICC standards. Neither standard polices such claims. As such, organizations are left with the responsibility for ensuring that courseware titles (and LMSs) are actually compliant. And it is up to the individual organization to decide on how much proof of compliance is considered satisfactory.

Complexity

The AICC standard is over 300 pages in length. SCORM is nearly 500 pages. Both are highly technical. They are not 'how to' guides and give no direction on exactly how to build systems. The standards are suitable for software engineers and not for typical courseware designers.

Unfortunately many courseware vendors do not have the technical expertise to fully understand the topic. Many vendors are ill equipped to treat courseware development as a software engineering project — dedicating teams of engineers, setting-up QA facilities and so on.

As a result, it is difficult for clients to objectively verify claims of compliance.

Time and Costs

Related to complexity are the issues of time and cost. Much of the courseware being developed today is custom courseware — relatively small projects with limited budgets. Unfortunately, many courseware vendors with such contracts (especially those new to SCORM and AICC) are more familiar with developing web-pages than with multi-month development projects involving researchers, programmers, QA staff and sourcing of LMSs for testing.

Added as an After Thought

One of the key reasons that much of today's courseware has problems is that many courseware vendors add SCORM or AICC compliance as an after thought. They have developed and sold large libraries of courseware. Only afterward (when a client requires AICC or SCORM) do they look at the standards. Vendors often try retrofitting existing courseware rather than rewriting it to meet the standard.

Lack of Testing

Many vendors do not test their content. This is particularly surprising since both the AICC and SCORM have (free) test suites available that will confirm if the material meets the minimum compliance levels. In addition, few courseware vendors actually test their courseware on commercial LMS systems — often due to the time (and sometimes costs) involved in developing partnerships and setting-up/maintaining test labs.

Do Not Follow "Best Practices"

Many course vendors do not follow "best practices" in designing their AICC and/or SCORM courseware. Although the courseware might technically follow the specifications and may pass the conformance tests, it just does not work as expected in real world LMSs. The conformance tests only test the mechanics of the course, not that the courseware is returning meaningful results.

For example, the courseware does not include descriptions suitable for display to users, returns strange scores, does not support bookmarking or asks the same questions during retakes. The material might be able to pass the test suite, but most clients will not accept that it actually "works" with such behaviors.

Preparing Yourself

As a customer, you should be aware that many vendors will not be able to provide suitable content. Some may say they are compliant anyway. Customers should be prepared to verify claims of compliance and, most importantly, exclude vendors that are not compliant.

The latter is extremely important. Some vendors will go to great lengths to convince customers to accept courseware that has compliance issues — often requiring changes to the LMS, logons to other systems, import/export of files — which are all outside of the AICC and SCORM standards. Such non-standard practices defeat the purposes of supporting standards.

What to Ask?

At a minimum, you should require all vendors to provide the following before even looking at any courseware:

Compliance Statement: All vendors can say they are *compliant*. Always get this in writing. Ask for a formal compliance statement that describes at a minimum: the name of the standard, the version of the standard the vendor follows, which optional features of the standard are or are not support, and what steps the vendor performed to ensure that courseware is compliant. You can also ask if a vendor is certified. Both AICC (and now SCORM) have independent test labs that (for a fee) will ensure that the courseware actually passes the conformance tests. Many courseware vendors do not have all their courseware certified due to cost and time issues.

Compliance Testing Results: Both AICC and SCORM have formal tests that courseware can be run against to verify minimum compliance. All vendors should provide the output of this as **minimum** proof of compliance. It is most improbable that any courseware that has not been tested will be compliant.

Testing on Real LMSs: Customers should require each courseware vendor to provide a list of actual LMSs that they have tested the courseware against. Working with one LMS is not proof that it will work with another. However, vendors who have taken the time to partner with, set up and test with various LMSs are much more likely to be serious about testing and ensuring compatibility.

How Long?: Ask vendors how long they have been developing AICC and/or SCORM courses. Require a list of titles and/or references of courseware that has been around for at least three years. Both standards have been in existence for nearly a decade. A track record of developing courseware following the standards demonstrates a greater knowledge of the issues. First time attempts to write AICC or SCORM software are rarely without problems.

Examining Courseware

Your next step is to examine the courseware. You should only do this once you are satisfied with the above answers. Do not spend your time examining courseware from vendors that cannot provide answers to the above questions.

Ask the vendor to provide sample courseware that includes assessments of some type with detailed instructions (including right and wrong answers for the questions). Try the courseware in your test environment. All vendors should have examples of courseware that they have created.

When examining the courseware at import:

- Ensure that the courseware is easy to install. Courseware requiring complex installations, local databases and other hoops to be jumped through are likely not compliant to begin with. SCORM requires all content to be deployable in a single .zip file without any further installation steps.
- Ensure that the courseware imports correctly. Ensure it has import files. After import, examine the fields of the course and unit(s) to ensure that names and descriptions are meaningful.
- Examine how the course is organized. Good courseware will typically have multiple assignments (units or SCOs) and be organized in meaningful ways (i.e., blocks). Check for fields such as pass scores, unit descriptions, and more. Check that the courseware has some type of sequencing rules.

When examining the courseware at launch:

- Ensure that the courseware does actually launch.
- Ensure that the courseware returns values when closed down. Some titles only send back values if you run the courseware in a specific way. For example, you must press a specific button. If users click on the 'X' to close the browser, some courseware merely closes down without returning any results.
- Ensure the courseware returns reasonable scores and statuses. Best practices say courseware should return *Incomplete* until finished, then return *Passed*, *Failed* or *Completed*. Courseware typically should not be returning *Passed* with a 0 score, nor *Failed* and a 100% score.
- Check if the courseware supports bookmarking. Well-designed courseware should resume at the point you left off. Questions that you already asked should hold your previous answers. The unit should not ask a question that you have already answered.
- Look in TrainingPartner after the launch to ensure that the values are being returned correctly.

If you encounter problems, you can look at built-in tools designed for debugging courseware. See TPSD4002. This document provides hints for debugging AICC and SCORM courseware designed by clients.

What to Watch Out For?

There are several things that should make you suspicious of any claims of compliance from vendors. These include:

Asking you about the standards: Questions such as where to find the standards, which standards you are talking about, how to send information to the LMS and how to import information are all covered within the standard are all red flags. If a vendor needs to ask such questions, it strongly suggests that they have not read (and therefore followed) the standards.

Unwillingness to provide a compliance statement or test results: This strongly suggests that the vendor has never tested its courseware.

Not providing a list of LMSs: The absence of a list of LMSs that the courseware has been tested against is not a good sign. This may indicate a lack of Quality Assurance testing or willingness to partner with or find real world LMS systems to test with.

Not asking which LMS you are using: This or the vendor not asking any specific questions about the LMS is red flag.

Wanting access to *your* LMS: Vendors who ask for access to your production LMS or who require that your staff test the courseware or try various settings is a bad sign.

Things to Look For?

Vendors who have prepared materials: If a vendor has a compliance statement, compliance test results and a list of LMSs that courseware has been tested against ahead of time is a positive sign.

Vendors who ask about your LMS: A vendor wanting details about your LMS indicates an interest in ensuring that the courseware is compatible.

Vendors with LMS partners: Responsible courseware vendors will probably have partnered with or at least contacted one LMS, if not several.

Conclusion

Learning technology standards are helping organizations use different technologies to create a custom solution that fits their needs.

As a result, organizations can choose content from multiple vendors and launch it all from a learning content management system from another vendor that is managed using a learning management system from yet another vendor — all because of standards.

However, most courseware vendors are compliant, but not certified, which means that they have not gone through the formal testing process. When selecting courseware, choosing AICC/SCORM-certified vendors should ensure interoperability with other AICC/SCORM-certified products.

If you are considering purchasing courseware from a vendor that is not certified, then you should ensure that the courseware is compliant following the recommendations above.

Many courseware-authoring tools now support AICC and/or SCORM standards. However, this does not mean that all content created with these authoring tools is automatically AICC or SCORM compliant. Please consult the vendor of the authoring tool to determine what steps are required to make content AICC or SCORM compatible. Purchasers should always ensure that they understand the technical and browser security issues associated with deploying AICC/SCORM-based courseware. If you are unsure if an electronic course is AICC-compliant, you should contact the courseware vendor. A list of vendors who create AICC-compliant courseware is provided on the AICC website.

To see a list of the different organizations involved in the development of standards for learning technologies, please see the following table.

Appendix: Standards Bodies

Following is a list of different standards bodies related to learning technologies.

Organization	Type	Description
ADL: Advanced Distributed Learning	U.S. federal initiative with participation open to all who can and wish to contribute	Documents, validates, promotes and sometimes funds the creation of specifications and standards. Original publisher of the SCORM specification. www.adlnet.org
AICC: Aviation Industry CBT Committee	Industry consortium that offers membership to all interested organizations	Produces specifications and implemented a certification program for CBT (computer-based training), which it turned over to ADL and IEEE LTSC in 2002. www.aicc.org
ANSI: American National Standards Institute	U.S. non-profit organization Recognized by ISO and the U.S. national standards body	Administers the U.S. voluntary standardization and conformity assessment system. Produces accredited standards and accredits standards organizations including IEEE. www.ansi.org
DCMI: Dublin Core Metadata Initiative	Open consortium that produces and disseminates specifications	An open forum engaged in the development of interoperable online metadata standards that support a broad range of purposes and business models. http://dublincore.org
ebXML: Electronic Business using eXtensible Markup Language	A modular suite of specifications produced as open industry standards sponsored by UN/CEFACT and OASIS	The ebXML goal is to provide an open XML-based infrastructure enabling the global use of electronic business information in an interoperable, secure and consistent manner by all parties. www.ebxml.org
EICA: Energy Industry CBT Alliance	A closed consortium intended to act as an e-learning consumer and participant in standardization efforts	EICA is the largest network of technology-based training users & developers in the energy Industry to pool technology-based training resources and knowledge of the largest energy companies. www.eicaonline.com
HR-XML Consortium	Non-profit open consortium that produces specifications with the intention of producing industry standards	The HR-XML Consortium is dedicated to the development and promotion of a standard suite of XML specifications to enable e-business and the automation of human resources-related data exchanges. www.hr-xml.org
IEEE LTSC: Learning Technology Standards Committee	The IEEE (Institute for Electronic and Electrical Engineers) is an accredited standards body that produces technology standards	The Learning Technology Standards Committee recommended practices and guides for learning technology. The LTSC coordinates formally and informally with other organizations that produce specifications and standards for similar purposes. http://grouper.ieee.org/groups/ltsc/index.html
IETF: Internet Engineering Task Force	An open organization that produces specifications and standards — open to any interested individual.	IETF is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. www.ietf.org
IMS Global Learning Consortium	IMS is a global consortium with members from educational, commercial, and government organizations	IMS Global Learning Consortium, Inc. is developing and promoting open specifications for facilitating online distributed learning activities such as locating and using educational content, tracking learner progress, reporting learner performance, and exchanging student records between administrative systems. www.imsproject.org
ISO: International Standards Organization	ISO is a worldwide federation of national standards bodies from some 140 countries, one from each country.	The ISO/IEC JTC1 SC36 is the International Electrotechnical Committee Joint Technical Committee 1 (Information Technology Standards), Subcommittee 36:Standards for Learning, Education, and Training. www.iso.ch
JA-SIG: Java in Administration – Special Interest Group	JA-SIG is developing a free, open source, open standard portal for higher education: uPortal	JA-SIG is an independent organization designed to increase the flow of information between educational institutions and companies involved in the development of administrative applications using Java technology. www.ja-sig.org

Organization	Type	Description
Masie E-learning Consortium	Open consortium with a limited number of available memberships that disseminates and promotes e-learning standards.	The e-Learning Consortium is a collaboration of major corporations, government agencies, and e-Learning providers focused on the future of e-Learning. The consortium sponsors workgroups, research reports and e-labs. www.masie.com
OASIS: Organization for the Advancement of Structured Information Standards	An international, not-for-profit consortium that produces specifications as open industry standards	OASIS drives the development, convergence and adoption of e-business standards and produces worldwide standards for security, Web services, XML conformance, business transactions, electronic publishing, topic maps and interoperability within and between marketplaces. www.oasis-open.org
SIF: Schools Interoperability Framework	Open consortium to produce a technical blueprint for K-12 software	SIF, a division of the Software & Information Industry, is an industry initiative to develop an open specification for ensuring that K-12 instructional and administrative software applications work together more effectively. http://www.sifinfo.org
SISC: Simulation Interoperability Standards Committee	SISC is an IEEE accredited standards body that develops simulation interoperability standards	SISC develops simulation interoperability standards and produced the High Level Architecture standards that are used by the simulation industry. www.sisostds.org
UN/CEFACT: United Nations Centre for Trade Facilitation and Electronic Business	A UN body open to participation by recognized organizations. Invited experts also participate.	UN/CEFACT covers worldwide policy and technical development in the area of trade facilitation and electronic business. It is the organization that produced the international EDI (Electronic Data Interchange) standard. www.unece.org/cefact/
W3C: World Wide Web Consortium	An open consortium that produces open specifications	W3C is a forum for information, commerce, communication, and collective understanding that develops interoperable technologies to lead the Web to its full potential. W3C also produces reference implementations such as the AMAYA Web browser. http://www.w3.org/
WebDAV.org: Web-based Distributed Authoring and Versioning	Open working group producing as specification.	WebDAV provides a network protocol for creating interoperable, collaborative applications. It has submitted its work to IETF for open standardization. http://www.webdav.org
XML.org	Web portal sponsored industry consortium Information portal	XML.ORG is an industry web portal formed by OASIS, the XML interoperability consortium, to minimize overlap and duplication in XML languages and standard initiatives by providing public access to XML information centralized repository. www.xml.org

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Proven in the marketplace since 1992, TrainingPartner™ from GeoMetrix offers a lower cost, more flexible alternative to high-priced enterprise learning management systems.

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