

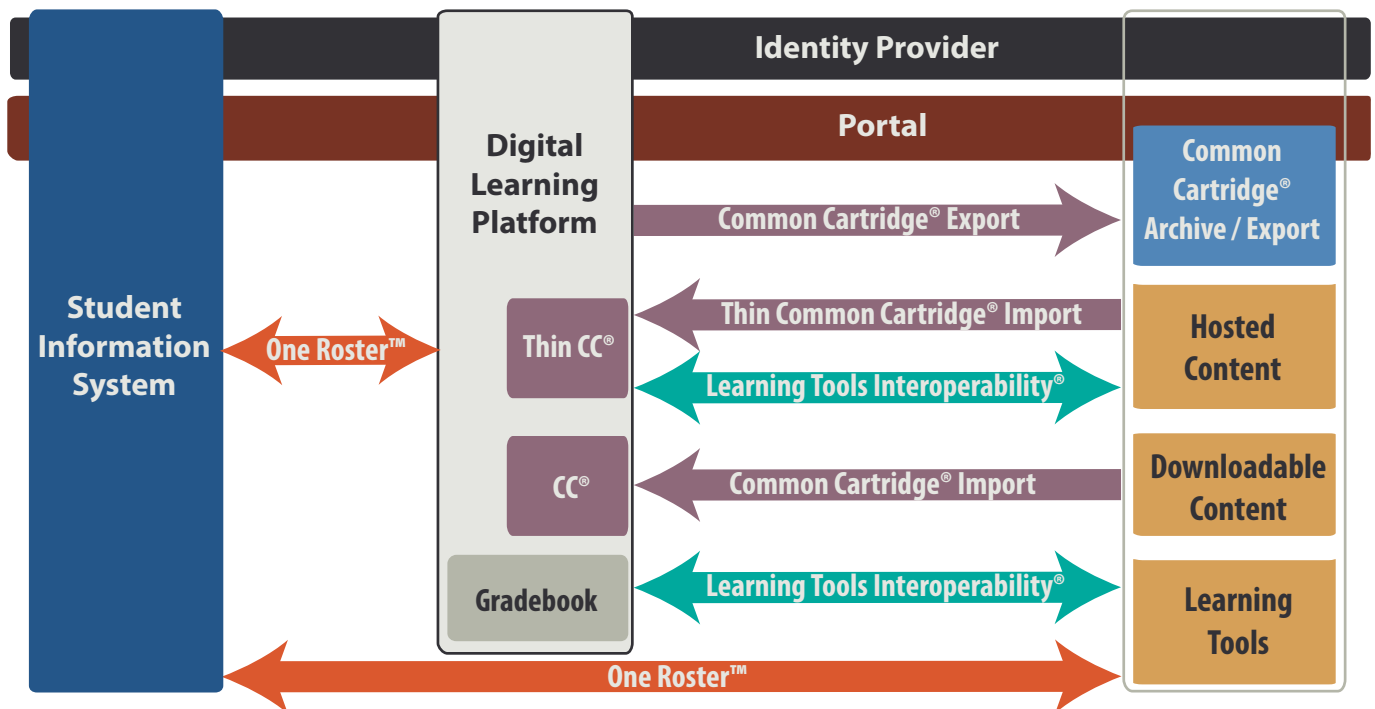
# Transitioning to Integrated Digital Curriculum Using IMS Standards



**IMS GLOBAL**<sup>®</sup>  
Learning Consortium

# The Concept of an Integrated Digital Curriculum

Many K-12 school districts are beginning to implement digital curriculum options for their teachers and students. IMS Interoperability Standards enable various types of digital curriculum resources to be seamlessly integrated into enterprise software that school districts already have or are adding. Integration of digital curriculum into district systems enables easy access to a variety of digital curriculum resources and enables support for personalized instruction. The enterprise systems may typically include a student information system, a portal, a digital learning platform, and an identity system. This document addresses the use of interoperability standards created by IMS Global Learning Consortium, a non-profit alliance of educational institutions and edtech suppliers, that enable a truly integrated digital teaching and learning experience. The diagram below shows this graphically, while the subsequent write-up explains the benefits and steps to implementation.



Regardless of the exact configuration of enterprise systems, the IMS Standards enable a wide variety of digital resources to be integrated. These include:

- **Hosted Content:** Digital content hosted in a web-based software application, such as adaptive learning content, games/simulations, or publisher e-textbook content that is run from a publisher-specific platform.
- **Learning Tools:** A wide variety of tools that are hosted as web-based applications, such as collaboration tools, assessment tools or mobile apps that connect to a web-based server application.
- **Downloadable Content:** Digital content that can be downloaded to school systems, such as courses or lessons that consist of web pages that are not updated by the content provider, assessment items, PDFs, and other types of static documents.

“The IMS standards are a critical component of Houston ISD’s digital transformation. Not only do IMS Global standards create a more effective teaching and learning environment, they also provide effective and economic solutions. Historically, HISD has built customized rostering integrations to suit each learning tool vendor’s individual needs, an extremely expensive, time-consuming and resource-intensive approach. Now that we have adopted IMS Global’s OneRoster standard, we anticipate reducing requirements gathering and development time by 75% - 95% for new rostering integration requests.”

- Lenny Schad, Chief Technology Information Officer, Houston ISD

## What Do We Mean by Integrated?

Integrated means the following six things:

1. **Seamless Access:** The digital resource can be accessed and displayed from a desired access point - either a portal or learning platform or both. The teacher or student clicks a link and the resource appears without having to manually “go somewhere else” on their computer.
2. **Single Sign-On & Authorization:** The teacher, student or parent is automatically signed into the content with the correct rights based on their role. For instance, when a teacher logs into a tool they may be able to see an activity report for all students in their specific courses or other teacher-only resources. By simply clicking the link to access the resource the teacher, student or parent is automatically logged in with the correct credentials and with the permitted access rights.
3. **Learning Context:** Access important context information to enable the application to know how to personalize the experience for the user, depending on the specific capabilities of the application. For instance, the application can remember where the student left off and bring them right back to where they left off. Another example is if the tool being used is a collaborative tool for a specific set of students, then when each of those students clicks the link to launch the tool they are automatically put into a session with their cohort.
4. **Outcomes and Results Data:** If the launched content or tool generates some type of score or other data for a user session, that data is automatically transferred back to the system that did the launching (assuming it is capable of handling/storing that data, as are most learning management systems).
5. **Search for Specific Topics:** Digital resources can be searched by teachers and students, much like doing a Google search, but limited to the resources that are integrated by the district and searched using educational parameters (such as grade level, learning standard, and so forth). This includes being able to search for and access specific entry points in a larger volume of content, much like being able to find and access a chapter or other subsection of a digital book directly.
6. **Archive/Export:** The digital resources that are created in a digital learning platform should also be able to be made available for use in the same or other other learning platforms. This provides the most flexibility and preserves the return on investment (ROI) for the district.

## Business Case for IMS Interoperability Standards for Publishers

As K-12 districts transition to digital curriculum and tools they are increasingly becoming aware of IMS Global interoperability standards as a practical strategy to enable a truly integrated digital teaching and learning experience. Likewise, publishers and content developers are finding that IMS standards present excellent new business opportunities to integrate digital content and resources into most LMS or teaching and learning platforms (TLP). Proprietary integration programs, such as platform-specific APIs (even “so-called open APIs”), limit integrations to a specific LMS or TLP. Proprietary integrations are too expensive for districts as well as publishers, who find they have to develop multiple integrations to integrate with every LMS/TLP.

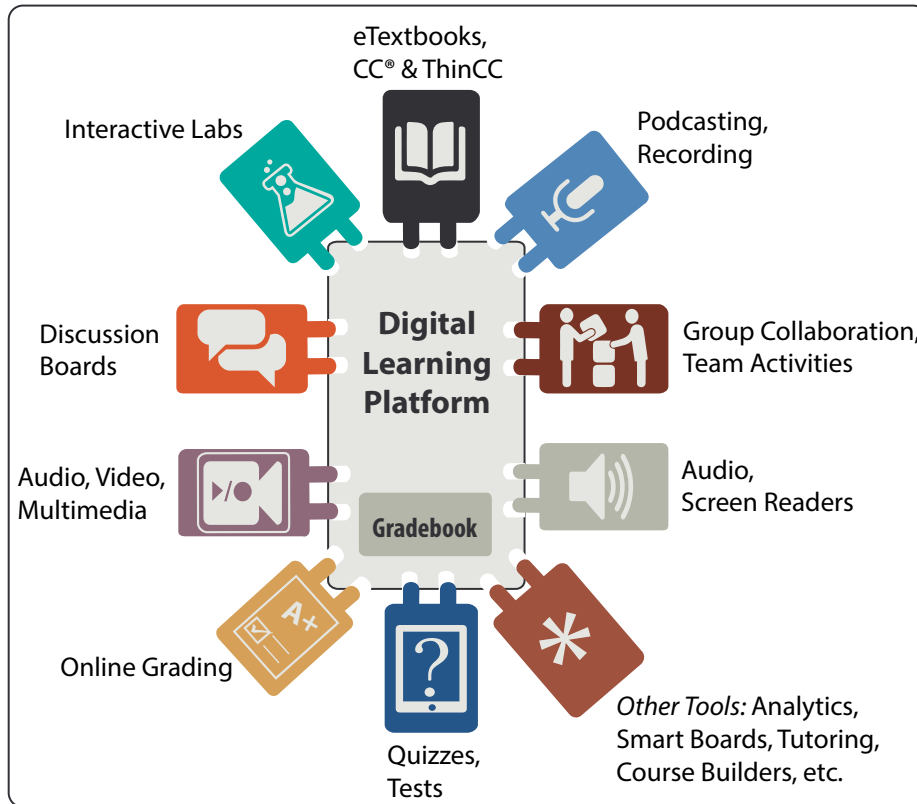
Once a publisher has adopted an IMS standard, such as LTI, Common Cartridge, or Thin Common Cartridge, they can integrate their content with little or no modifications, eliminating the need to build costly proprietary integrations. Each of these standards offer a unique set of benefits for publishers. For example:

- LTI offers, at minimum, a very simple and inexpensive single sign-on solution. Other helpful functionalities can be added as one adopts higher version levels, including bi-directional data, with the option of returning grades into the LMS or platform. LTI provides publishers of all sizes with a very simple and inexpensive form of Single Sign-On that can be implemented in less than a day.
- Common Cartridge (CC) allows vendors to export entire teaching and learning sets, complete with various types of files, including interactive features, white board materials and assessments. The CC offers options to search content by topics, concepts, standards, grade levels and other tags, making the publisher’s content available on its entirety through the LMS without additional Login ID and passwords.
- Thin Common Cartridge (TCC) allows publishers to keep all the content in their own servers (with the additional ability to update easily) while retaining the CC capacity to perform searches and “discover” the content via local search in the LMS, even though it resides outside of the LMS/TLP library.
- Both CC and TCC provide opportunity to chunk content into discrete objects, with their meta-tags, so teachers and students can perform searches that might produce a list of content modules from various publishers.
- The OneRoster standard provides districts and publishers with a universal format to exchange roster data between systems, reducing costs and production time dramatically.

# Steps to Achieving the Integrated Digital Curriculum

To achieve an integrated digital curriculum that has the features detailed above across digital resources coming from a wide variety of suppliers requires that the products implement some very simple interoperability standards from IMS. The following outlines what is required:

## Plug & Play Interoperability Enabled by LTI®



### Step 1: Learning Tools Interoperability® to Enable Plug & Play, Seamless Integration

First, the learning platform or portal that you wish students and teachers to access resources from must be certified by IMS Global as a Learning Tools Interoperability® (LTI®) Consumer (or Platform). This means that the Learning Platform or Portal can easily integrate with LTI certified “providers.” LTI providers range the gamut of content and tool sources (items A and B above). For instance your Learning Platform might be SAFARI Montage, which is certified as an IMS consumer, and one of your LTI providers might be Harcourt’s (HMH) Science Fusion product, which is certified as an IMS provider. Each of the LTI providers integrates to the LTI platform in exactly the same way by a system administrator who follows the LTI instructions that come with the tool. The current list of IMS LTI certified platforms and providers can always be found at [www.imscatalog.org](http://www.imscatalog.org).

A checklist for districts wishing to procure LTI enabled products is available at:

[www.msglobal.org/IMSLearningToolsInteroperabilityChecklistandRFPLanguage.pdf](http://www.msglobal.org/IMSLearningToolsInteroperabilityChecklistandRFPLanguage.pdf).

With LTI at the core of your portal and/or learning platform you have achieved the first step to an integrated digital curriculum. LTI enables the first 4 of the integration features described above. Adding two more IMS standards to the mix enables additional capabilities.

## Step 2: Adding Common Cartridge® to Enable Additional Digital Content Features

LTI enables a launch of an application (learning tool or web-hosted content) that passes rich information so that the application can treat each user uniquely, thus enabling integration of content types A and B above. How do we handle content type C - digital content that is desired to be downloaded into a learning platform? This would be content that the content provider does not wish to update while in use and that does not require any special application (such as an adaptive learning platform) to run, and thus can be downloaded and made available on the learning platform. IMS Common Cartridge is the standard to use for integration of this type of content. Common Cartridge provides a standardized format for this type of content to be “packaged up” by the content provider and then ingested by a Learning Platform where the teacher can manipulate the pieces of content. For instance, if there is a PDF as one resource in the package the teacher can put that PDF anywhere in a course or other student workspace.

To implement Common Cartridge you will need a Learning Platform that is IMS certified to import Common Cartridge (containing the content) that is IMS certified. The current list of IMS Common Cartridge certified products can be found at [www.imscatalog.org](http://www.imscatalog.org). A checklist for procuring Common Cartridge enabled products is available at: [www.imsglobal.org/CommonCartridgeChecklistandRFPLanguage.pdf](http://www.imsglobal.org/CommonCartridgeChecklistandRFPLanguage.pdf).

Note that Common Cartridge supports a very neat feature of being able to include LTI links inside the cartridge. This means that if a cartridge containing LTI links is ingested into the Learning Platform those links can now be placed anywhere in the course and accessed by the teachers and students.

Another feature of Common Cartridge is support for assessment items and tests to be included in the package in a very popular interoperable format called QTI® (Question and Test Interoperability®) from IMS. QTI and a close cousin that enables advanced accessibility features, APIP® (Accessible Portable Item Protocol®), are the interoperability formats for e-Assessment being used by the Race to the Top (RTTA) assessment consortia (Smarter Balanced, PARCC, NCSC, WIDA, etc.) as well as independent states.

So, a cartridge can contain changeable content (e.g., web pages), static content (e.g., PDF), assessment items and LTI links (among other things discussed in the Common Cartridge specification). Nice!

Once Common Cartridge is in place you have not only enabled content type C (listed above), but have also enabled integration feature #5, Search. How? There are two ways search is enabled via Common Cartridge:

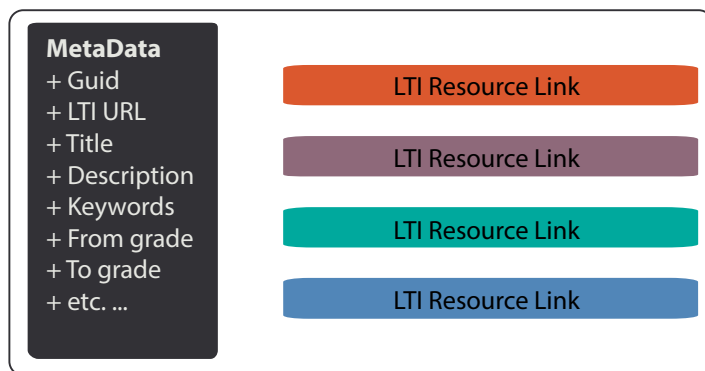
- The various components within a Common Cartridge can be labeled with metadata. For instance, a PDF inside a cartridge can be labeled with metadata, meaning that the Learning Platform could turn that PDF into a searchable learning object. This is true of any other components in the Common Cartridge that the content provider chooses to make available in this manner.
- Each LTI link in a Common Cartridge can represent a specific entry point into a web hosted content source and be labeled with metadata. A good way to think about these LTI links might be the chapters, topics or lessons within a digital book. Thus, by ingesting a Common Cartridge with LTI links of this nature, labeled with metadata the Learning Platform can now enable teachers and students to search these links, find one that is specific to their needs, and click on it to enter the hosted content application directly at the point of interest.

“Standards developed with IMS Global gave us a way to solve the problem of how to unify our own solutions and make them work together on different platforms.”

- Andrew Kuritzky, Product Management Director at Houghton Mifflin Harcourt

## Alternate Step 2: Thin Common Cartridge®

### IMS 'Thin' Common Cartridge®



Turning content sources into cartridges with links with metadata that could be ingested by Learning Platforms was such a great idea, that IMS came up with a special subset of Common Cartridge called Thin Common Cartridge. More and more digital content, especially the dynamic and interactive kind, is being web hosted. Therefore, one could argue that links with metadata (Thin Common Cartridge) is all that is really needed to get interoperability. IMS created the specification because we witnessed it happening in the marketplace. Thin Common Cartridge is easier to implement than the entire Common Cartridge specification, especially for Learning Platform providers. A checklist for procuring Thin Common Cartridge enabled products is available at:

[imglobal.org/ThinCCChecklistandRFPLanguage.pdf](http://imglobal.org/ThinCCChecklistandRFPLanguage.pdf)

“Gwinnett has been able to accelerate our digital conversion efforts faster than would have otherwise been possible as a direct result of our collaboration with IMS Global and its members.”

- Tricia Kennedy, Executive Director of eCLASS Transformation, Gwinnett County Public Schools

## Step 3: Unified Rostering with IMS OneRoster™

LTI is a mechanism for controlling access to digital resources when access is based on a grouping of students that the LTI consumer (Learning Platform or Portal) can understand or enforce. For instance, if a particular digital resource is available only to 4th graders or students in some specified course sections, LTI can ensure that only those students have access. However, in order for that to work, the Learning Platform or Portal must have the student information and must be capable of grouping students and making resources available to those groups. Therefore, if the LTI “consumer” is (a) provided the student information via an integration to your student information system or identity system, and (b) has the functionality to do sophisticated organization of resource access, then LTI goes a long way to ensuring that only those teachers and students who are authorized to access a specific digital resource can access it. LTI passes information on the students to the installed LTI tool or content source. There are several options on how to do this, but the default is to NOT pass the official student ID in order to protect privacy.

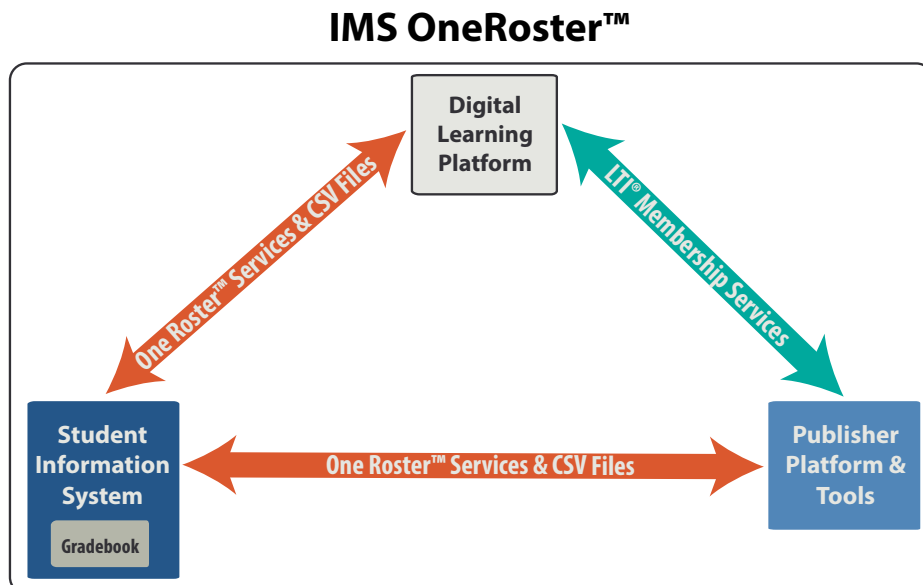
However, while LTI is great, there are many potential issues to ensure access and authorization to digital resources. For instance, not all applications in the school district will be integrated using LTI from day one or ever. And, there may be multiple learning platforms or portals supporting LTI integrations. Each of these launch points may have different functionalities with respect to being able to provide or deny access to digital resources via various types of groupings and could potentially use different IDs for the same student. And, of course the LTI consumer needs the student information to support any or all of the above, such as access by course or grade. It is also possible that the tool or content source may support grouping of access that is more sophisticated or nuanced than what the LTI consumer supports. The licensing models of some publishers may require that they can count the number of unique users. Finally, enabling analytics will require a consistent set of student information context data across all systems that can generate data.

To address all of the potential issues described, IMS developed the OneRoster specification. OneRoster was created to make things dramatically easier for school districts that have been uploading roster information on a nightly basis to a large number of web-hosted content providers so that teachers and students could login directly to each system and be authorized based on the information from the student system. The challenge for school districts is that they have had to foot the bill for the effort required to translate and provide the information in a vendor specific format. OneRoster is a well-defined simple specification that school districts can adopt and require vendors to obtain conformance certification.

Using OneRoster to roster all of the district’s applications ensures each application has a standard way to identify a student or teacher. Additionally, if the Learning Platform or Portal used to launch applications uses LTI and passes the same ID, this increases the flexibility in terms of the types of launching, authorization and licensing models that can be supported.

Once OneRoster is implemented a district has numerous options in terms of the launch off point(s) for integrated digital curriculum. For instance, some digital curriculum resources can be accessed using LTI via the Learning Platform. Others can be accessed using LTI via a much simpler portal. And, others can be accessed via a single sign-on via a simple portal or direct links supported with login credentials from an identity system.

For more information please refer to the One Roster Overview here: [www.imsglobal.org/IMSOneRoster.pdf](http://www.imsglobal.org/IMSOneRoster.pdf).



### Identity Provider (Authentication)

Most districts will have a centralized identity management system for managing user access via one of the industry identity provider solutions e.g.: ADFS (Active Directory Federation Services); LDAP (Lightweight Directory Access Protocol) etc. The entry point for access to districts systems is generally handled via a district portal. IMS standards like LTI and OneRoster work nicely with information that may have originated from the identity provider. LTI for example has a field called sourcedid that could be used to pass a unique student or teacher identifier as part of its payload. OneRoster has a field called "identifier" that can be used to pass this unique student or teacher identifier.

## Conclusion

Broad adoption of IMS standards by ed-tech suppliers and districts will:

- Enable seamless plug & play integration of content, applications and platforms to create better user experiences;
- provide an agile open architecture and extensive ecosystem to enable experimentation, flexibility and efficiency in a time of rapid change; and
- result in effective collaboration between districts and ed-tech to enable better learning through better technology!

### Questions?

Contact Chris Chung, IMS Global K-12 Community Facilitator, [K-12@imsglobal.org](mailto:K-12@imsglobal.org) for additional details about how your district can benefit from the work of the IMS Global community and begin to move towards an open architecture that will provide greater flexibility and options to evolve personalized learning.

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