# A Taxonomy of Education Standards

Brandt Redd – March 2013 – CC0[1]

Types of Standards

There are three types of standards that are involved educational efforts: **Academic Standards**, **Data Standards** and **Technology Standards**.

Academic Standards include achievement standards like the Common Core State Standards (CCSS)[2] plus curriculum and testing standards. Contemporary practice in the U.S. is to describe academic standards in the form of learning objectives – descriptions of skills that students can acquire or demonstrate. Historically it was more common to describe standards in syllabus form – as a list of subjects to be studied.
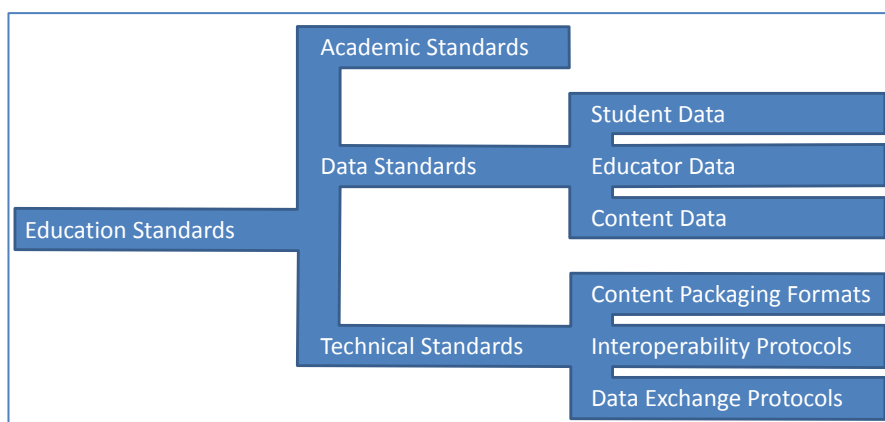
Encouraged by the No Child Left Behind Act, the 50 states have each defined core curriculum standards. More recently, the CCSS standards for Mathematics and ELA-Literacy have been adopted by 45 states. Using a similar process, the Next Generation Science Standards[3] have been proposed for multi-state adoption. In higher education there is no such consistency. Some institutions have developed their own sets of standards but most leave the objectives up to the professor. A few industry organizations publish standard sets. These include the AAAS Benchmarks for Science Literacy[4] and the National Center for History in the Schools standards for History[5].

Data Standards define the data elements and structures used to store and exchange educational information. In the Four-Layer Framework[6] data standards may include layers 1-3 (Data Dictionary, Data Model and Serialization).

For education, the three major domains of data standards are **Student Data, Educator Data** and **Content Data**. Important metrics like graduation rate, student financial aid repayment or college-going rate are derived from data sets but aren't data in and of themselves.

Student data includes traditional demographic information as well as a student record which includes academic achievements, assessment results, learning activities, attendance and so forth. **Educator Data**

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http://creativecommons.org/publicdomain/zero/1.0/
[2] http://corestandards.org
[3] http://www.nextgenscience.org/
[4] http://www.project2061.org/publications/bsl/
[5] http://www.nchs.ucla.edu/Standards/
[6] http://x.ofthat.com/papers/fourlayer.pdf

includes information about teachers and staff. It includes qualifying information like academic credentials, a portfolio of creative works and publications and data about teaching performance. **Content Data**, often called metadata, is information about learning materials including textbooks, assessments, multimedia and digital resources. Content data often indicates the alignment between learning resources and academic standards like the CCSS.

Technical Standards define how systems interoperate. Accordingly, they usually include the protocol layer of the Four-Layer Framework. A wide variety of standards may fit into this category but the majority of education-related technical standards involve Content Packaging Formats, Interoperability Protocols and Data Exchange Protocols.

Content Packaging Formats support the transport of learning content (e.g. text, video, graphics, etc.) and assessments between systems. Examples include IMS Common Cartridge[7] and SCORM[8].

Interoperability Protocols support interoperability among learning systems. The most common use case is integration of learning tools (like simulations, games or assessments) into learning environments (like a learning management system). Key functions are to identify the user to the learning tool, ensure that they are authorized to access the content, transfer control to the tool, and collect data back. Common examples include OpenID[9], SAML[10], OAuth[11] and IMS QTI[12].

Data Exchange Protocols represent layer 4 in the Four Layer Framework for Data Standards. Thus, data exchange protocols are usually paired with a corresponding data standard. Frameworks for setting up data exchange protocols include ESB[13], SOAP[14] and REST[15].

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[7] http://www.imsglobal.org/cc/
[8] http://www.adlnet.gov/capabilities/scorm
[9] http://openid.net
[10] SAML: Security Assertion Markup Language http://www.oasis-open.org/committees/security
[11] OAuth: Open Authorization http://oauth.net
[12] IMS QTI: Question and Test Interoperability http://www.imsglobal.org/question
[13] ESB: Enterprise Service Bus http://en.wikipedia.org/wiki/Enterprise_service_bus
[14] SOAP: Simple Object Access Protocol http://www.w3.org/standards/techs/soap
[15] REST: Representational State Transfer http://en.wikipedia.org/wiki/Representational_state_transfer