

The Learner Performance Data Model: Storage, Persistence, and Reporting

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Abstract

SCORM supports a rich runtime data model for learner performance data. Access to these data outside of runtime, however, is limited and inconsistent. SCORM 2.0 should be clear in requiring data stored during a learner interaction to be persisted beyond the interaction. This would open up a wealth of possibilities, including (but not limited to) the sharing of runtime data between SCOs and the reporting of learner performance data to non-learners outside of runtime. These possibilities would allow for much greater detail in assessing learner performance within the context of SCORM.

Problem Definition

Assessment of learner performance requires that learner performance data remain following a learner interaction. While SCORM provides SCOs access to a rich runtime data model through the SCORM runtime API, it does not require that these data persist beyond the learner interaction. This makes the assessment of learner performance difficult within the context of SCORM. It also limits developers in their ability to assess the quality of the materials.

Assessment of learner performance also requires a method to access learner performance data outside of runtime. Non-learners such as (but not limited to) course administrators, instructors, subject matter experts, and content developers will never engage the content in a learner interaction, but such individuals often require a detailed report of the learners' interactions with the content.

Some LMSs provide reports for learner performance data, most often as a requirement of clients who were willing to pay for such a feature. Simply displaying all the learner performance data present in the database is not always effective, however, given that LMS vendors and content developers both have a level of flexibility in how they implement and use the SCORM runtime data model. Consequently, generating learner performance reports that are both detailed and clear requires a significant level of collaboration between LMS vendors and content developers. One of the principle purposes of SCORM is to eliminate the need for such collaborations.

Use Cases

LMS vendors

An LMS vendor creates an LMS that renders learner performance data persistent and provides a way for the content to determine how reports are generated. The LMS vendor can confidently guarantee useful and detailed reports without the need to tailor the LMS to the content (or vice versa).

Content developers

A content developer knows that the learner performance data stored by a SCO during runtime will persist beyond the scope of the learner interaction. The content developer knows how the content uses the runtime data model and knows which learner performance data are required in a learner performance report by the client. The content developer writes instructions so that the LMS knows

which data are required and how to organize those data in the learner performance report. The content developer does not need to tailor the content to a specific LMS's reporting features.

Course administrators/instructors

The course instructor is familiar with the content and knows which learner performance data are useful to include in a learner performance report and how they should be organized. The instructor communicates this information to the content developers. The instructor can then obtain reports from the LMS according to the requested format without further collaboration with the content developers or LMS vendor.

Stakeholders

LMS vendors

LMS vendors would greatly benefit if they could guarantee detailed learner performance reports for any content loaded into their system while retaining the flexibility to implement the LMS database in any way they choose.

Content developers

Content developers would be able to write instructions to generate learner performance reports for their content that will be compatible with any SCORM 2.0 conformant LMS. This will eliminate the need to tailor content to a specific LMS and ensure developers flexibility in how they use the runtime data model. These reports will increase the ability of the developers to analyze the effectiveness of the content as well as plan and implement improvements.

Course administrators/instructors

Course administrators/instructors/etc. would be able to obtain clear, detailed reports of their learners' performance without the need to pay LMS vendors and content developers to collaborate beyond current operational SCORM-conformant contexts.

Proposed Solution

SCORM 2.0 should be clear in requiring that learner performance data stored during runtime should persist beyond the learner interaction with the content. The persistence of learner performance data is prerequisite to detailed assessment of learner performance. This requirement will open up many possibilities, including the sharing of runtime data between SCOs and the reporting of learner performance data to non-learners outside of runtime.

SCORM 2.0 should also provide a way for the content to communicate to the LMS how its related learner performance data should be organized into learner performance reports by the LMS, the same way that a manifest communicates to the LMS the logical structure of the content in a package. Content developers decide which elements of the runtime data model are used and how they are used to store learner performance data, and thus content developers should decide how these data elements are organized and presented to report on learner performance.

It may be possible to use an existing format or specification, or modify one to address this issue. For example, the Report Definition Language (RDL) is an XML-based language proposed by Microsoft for defining how reports are generated from a database. Alternatively, the Structured Query Language (SQL) is an ISO standard and is used in most current relational database management systems. While neither of these are a suitable out-of-the-box solution,

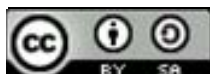
their governing concepts could be adapted to provide developers access to learner interaction data stored in an LMS database.

Technical Issues

It should be noted that LMS vendors have flexibility in implementing a database to satisfy the requirements of the SCORM runtime data model. Likewise, content developers have flexibility in choosing how to use that data model. Therefore, whatever standard is adapted to address this issue must not be tied to a particular implementation or database management system. Query elements must map to SCORM runtime data model elements and not to a particular database structure. LMS vendors, who know the structure of their database, will then map these query elements to data elements in their particular database implementation.

Summary and Recommendations

Although SCORM supports a rich learner performance data model, SCORM 2.0 should require that these data be available after runtime. Additionally, in SCORM 2.0, content should have the ability to communicate how its learner performance data should be organized into a learner performance report, the same way that a content package communicates the structure of its content with a manifest. To do this, an existing standard should be adapted that will allow the content to query an LMS database for specific data model elements. It should be noted that LMS vendors have flexibility in implementing a database to support the SCORM runtime data model, and content developers have flexibility in how they use the data model. Accordingly, any solution chosen must not be restricted to a particular implementation or database structure.



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