

Full-text Search in Learning Objects – By the LMS, for the SCO

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1. Abstract

We describe how the extension of the SCORM metadata model, along with the mechanism we have proposed elsewhere for launching SCOs at a particular page or section, would allow LMSs to implement full text search of learning content, then launch a SCO at the user's request on the exact page or section which the search matched.

2. Problem definition

We are frequently asked by clients who are authoring content or procuring Learning Management Systems (LMSs) if learners can carry out full text search on SCOs through the LMS.

This is not currently possible for two reasons:

1. Content comes in many forms (Flash, HTML, a variety of document formats, video, etc), so it is not possible to build an LMS that will be able to interpret and index the text of an arbitrary piece of content
2. Under the current SCORM, The LMS is not aware of the internal structure of individual SCOs, what different sections of the SCO contain, nor how to launch a SCO at a particular section.

We propose an extension to the SCO metadata, whereby the internal structure of a SCO is documented in meta-data, along with the full text for each section or page of this structure. Alongside the mechanism we have proposed elsewhere¹ for launching SCOs at a particular page or section, this would allow LMSs to implement full text search, then launch a SCO at the users request on the exact page or section which the search matched.

3. Use cases

An example of how this feature would be used is informal, search-driven learning:

- A learner performs a search on the LMS – for example for 'elliptical bearing'
- The LMS returns a list of results, including individual pages or sections within a SCO which contain this term
- The learner clicks on one of these links and the SCO is launched, opening directly at that page or section
- The fact that the learner has launched this SCO, and any tracking information recorded by the SCO is reported to the LMS just as though the SCO had been launched 'normally'

¹ See 'Bookmarks and Links' (<http://www.letsj.org/letsj/display/nextscorm/Leader+-+Bookmarks+and+Links>)

4. Proposed solution

We propose that the SCORM metadata model should be extended to include a per-SCO section that allows the SCO to document its internal structure (e.g. pages or sections) and the text of each section. For example:

- Section 1
 - Location code: SEC001
 - Title: Introduction to component sales
 - Text: Lorem ipsum dolor sit amet, consectetur adipiscing elit. Maecenas ac nulla at neque fringilla luctus. Sed fringilla mattis pede. Nulla facilisis mi ac sem adipiscing consequat. Phasellus tortor velit, sollicitudin quis, commodo viverra, vulputate nec, nisl. Suspendisse vitae leo. Cras pretium viverra nisl.
- Section 2
 - ...

The LMS would use this to create an index of the SCO structure and contents, which could be indexed by an arbitrary free-text search engine. A learner would use an interface to this search engine to find content, and upon their request, the LMS would launch the content, passing it instructions to launch at the section identified by the 'Location code'. This is not currently possible in the SCORM, but could be supported in a variety of ways, such as the one we describe in the white paper 'Bookmarks and Links' (<http://www.lets.org/lets/display/nextscorm/Leader+--+Bookmarks+and+Links>).

The full-text metadata described here, like any meta-data, is a merely a representation of the object and its contents, and it is therefore the responsibility of the content author to create this structure in addition to creating the content. The content author may decide not to include all text (for example, navigation text may appear on each screen, but this is probably not useful for searching), and might even miss out some pages (e.g. a section on 'how to use this course', or a visual activity with no text). Audio and video could only be indexed if a transcript of the text was available (although in many cases this may already be available to increase the accessibility of content)

Although creating the full-text index is extra work for the content developer, most development today is undertaken with authoring tools that could automatically generate free-text indexes – considerably less work (and we believe more useful) than other search metadata approaches such as keywords.

5. Summary and recommendations

In summary, we recommend the extension of the meta-data and SCO launch mechanism to support full-text search of the SCO's contents by the LMS, and launch SCOs at the individual pages or sections where the text can be found.

6. LINE Communications

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