Creating accessible SCORM content from OpenLearn material

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Abstract

This presentation shows how OpenLearn material has been used to create accessible SCORM learning objects that can be delivered using a third party virtual learning environment (dotLRN). This work was carried out as a part of a European Union project called ALPE. The activity of adapting the OpenLearn material has helped the VLE developers further understand the activity of creating accessible learning material and help inform the development of the VLE.

Introduction

This presentation illustrates how OpenLearn materials have been used to create a set of standards-based accessible SCORM learning objects that can be used within a virtual learning environment called dotLRN. The dotLRN is used within the Spanish National University for Distance Education (UNED), the Spanish equivalent to The Open University.

The following section describes why the OpenLearn material was chosen. This is followed by a description of some of the process used to create the learning material. An outline of changes made to the material is also presented. The final section presents what has been learnt.

Why use OpenLearn?

The ALPE project is a consortium comprising of the Spanish National University for Distance Education (UNED), The Open University in the UK, a well known Spanish consultancy firm (Soluziona/Indra), and a non-profit organisation in Greece (PAB) that supports people with visual impairments. The aim of ALPE is to provide assistance to private and public institutions to enable them to create accessible learning material. When establishing the project it was decided to create a series of exemplar materials to further understand some of the difficulties inherent in creating accessible content.

This activity was perceived to have several benefits: it allowed a further understanding of the current advantages and shortcomings of the virtual learning environment used by UNED (dotLRN) to be understood, permitted a detailed exploration into the pragmatics of developing accessible materials and the surrounding legislative frameworks, and allowed the Open University Accessible Educational Media (AEM) team to further inform the accessibility dimension of the OpenLearn content.

The dotLRN VLE provides a standards complaint SCORM player. SCORM is an abbreviation for Sharable Content Object Reference Model. Originally developed by an office from the US department of defence, SCORM is a recognised elearning standard that is used within many different VLE systems, including Moodle.

Content development process

The structure of the OpenLearn courses is mostly described using a single XML file. This single file is divided into separate sections, chapters and paragraphs which then hold the 'words' of the learning material. This file also contains additional information such as a title, a description and a set of useful keywords to describe a course. Links to other important resources such as images, videos and transcripts are also included. One of the key advantages of storing the majority of the content in such a way is that it offers content developers an opportunity to manipulate the content using a computer program allowing them to generate new material to suit their precise needs.

A SCORM course can be described as a learning object: an individual unit of learning that can be combined with other units to create a course. The structure of a SCORM learning object has some resemblance to the OpenLearn content that can be downloaded from the LabSpace area. SCORM and OpenLearn 'learning objects' both use a zip file to aggregate different resources together (such as images, audio clips, PDF files and videos) and both utilise XML but in different ways. Whilst the OpenLearn learning object stores the majority of the content and structure in a single file a SCORM learning object, on the other hand, contains an XML file that can be though of a simpler 'table of contents'. This XML file (known as a manifest file) stores internal references to HTML pages or and other related resources found with same zip file

Conversion from the OpenLearn to the SCORM format required four steps, (1) the extraction of content from the OpenLearn XML file to create a stand-alone web-pages, (2) making a 'table of contents' XML structure that reference the newly created XML pages, (3) creation of appropriate course metadata in the SCORM format and (4) combining together all the resources and files (including the important table of contents) into a single unit.

Each OpenLearn course zip file contains a preview mechanism that allows any changes to an OpenLearn XML file to be viewed as a set of web-pages. The provision of this mechanism, primarily in the form of an XSLT transform, accelerated the SCORM conversion process. When an OpenLearn editor or 'remixer' wishes to preview changes to the OpenLearn XML a user is presented with a set of web pages by using the preview system. Each web page contains its own navigation system, allowing different pages to be viewed. SCORM does not need the integrated navigation system since each learning environment that offers SCORM usually has its own content navigation mechanism. The first and perhaps most important stage of the conversion activity was to remove the navigation mechanism by creating a new version of the preview mechanism.

A number of additional modifications to the XSLT transform that were made to create a set of web pages needed by the ALPE project. These are summarised as follows:

1. Production of XHTML 4.0 compliant pages.
2. Reference of a single style sheet (CSS) file for both main content and pop-up windows.
3. Removal of selective Javascript code.
4. Using of semantic mark-up.

The table of contents and the metadata used to describe the learning object were created using a tool called RELOAD. RELOAD is a packaging and learning object editing tool that is considered to be many as a reference model implementation of a number of different international learning technology standards. All the generated web pages were loaded into RELOAD and a table of contents 'organisation' was built by hand (although this activity could have been mechanised with the development of an additional OpenLearn to 'table of contents' XSLT transform). Metadata information (such as the title, description and keywords) was extracted from OpenLearn XML file by hand and attached to the table

of contents manifest file, enabling the new material to be searched for if stored within a learning object repository.

When all these items were in place, a new SCORM learning object was created by packaging these components into a single zip file. This zip file was then transferred to the dotLRN VLE system for testing.

Accessibility enhancements

Since the OpenLearn XML file is the primary source of the content, the accessibility of the end product depends on how complete the original XML data is and the quality of the XSLT transform that generates the resulting web pages.

The modified XSLT placed emphasis on the use of semantic mark-up as opposed to earlier presentation mark-up approaches (using , or emphasis tags rather than <b>, or bold tags). This allows greater control of the presentation of the material using Cascading Style Sheets which in turn assists with maintenance as well as accessibility since more content specific information is presented to assistive technologies such as screen readers.

The OpenLearn XML content makes excellent provision for alternative resources. Each graphic can be given an alternative description that can be used by screen readers. Unnecessary redundancy between the alternative text and corresponding figure headings were removed since unnecessary repetition would disorientate users who access the material though a screen reader. Finally, in some cases, alternative descriptions of images were missing from the original XML source. Where omissions were found, the XML was updated and the new content generated.

Conclusions

The OpenLearn content has proved to be a useful tool for the development of accessibility and learning technology standards expertise throughout the project consortium. As well as understanding how to create accessible learning material, the OpenLearn content has been to understand how the dotLRN VLE could be improved. The material has helped to inform the further development of the VLE's SCORM navigation controls, benefiting a wider community of users.

References

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