Online Curriculum Development: A Mezzanine Approach

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INTRODUCTION

The development of online curriculum provides an opportunity to rethink traditional workflows and approaches to curriculum mapping. An XML-based single-source model is used to illustrate some key practical and conceptual challenges. A mezzanine approach to curriculum is proposed, which seeks to conceive of curriculum as a three-dimensional space embedded within various networks.

The final part of the discussion then seeks to contextualise these challenges in the recent climate in which user-generated, participatory technologies have made a resurgence. Here, the single source case study highlights some complimentary benefits of using a conventional learning-object approach that provides scope to encompass the social, participatory, and collaborative aspects of "E-learning 2.0."

BACKGROUND

Beneath the familiar hyperbole associated with the latest technological trends, the development of user-driven and computer-supported collaborative learning applications (such as blogs and wikis) have simplified the use and sharing of educational resources and experiences. Many educators now incorporate these software applications into their courses, as well as the ethos of user collaboration driving their development (Augar, Raitman, & Zhou, 2006). Controversially labelled "Web 2.0," this broad attitudinal shift is also characterised by the adoption of open standards and applications that are interoperable and widely accessible. Educators are increasingly aware of how the educational use of Web-based approaches, such as collaborative learning through virtual learning environments (VLEs), impact upon student learning by supporting valuable processes of knowledge construction and online collaboration.

Trends, such as E-learning 2.0, reflect a similar shift in educational thinking beyond the conventional digital repository and learning object approach. Much of the current educational literature on e-learning seems, however, to be cautious; perhaps in part to counterbalance the excessive enthusiasm and hyperbole accompanying e-learning during the late twentieth century. Halavais, for example, soberly reflects that

"the software designed to maintain weblogs is little more than a simplified content management system… The excitement… has less to do with flexible systems that ease the process of web publishing, and—like many technologies that allow for virtual interaction—more to do with the cultural practices that have evolved using these technologies as a foundation" (2006, p. 1215).

There is certainly greater understanding and awareness of how technology should service and enable educational processes and practices rather than define them. And while educational needs and goals should always precede the educational use of any technology, the transformative capacity of Web-based information and communication technologies (ICTs) to challenge how educators think about sharing information, social interaction and knowledge building remains significant; moreover, it provides a positive opportunity to reflect on how we teach and learn.

RETHINKING ONLINE CURRICULUM: A MEZZANINE APPROACH

Following Halavais' reflection, this discussion is concerned with the practices that arise from the educational use of ICTs rather than any particular technology; namely, the benefits of developing curriculum for use via online, paper, and other methods.

Rather than focus on the use of participatory applications such as blogging and wikis, the positive and negative challenges arising from an XML-based

approach to developing online curriculum content will be used as an illustrative example. This example is suitable for the dissemination of educational content to a large number of students via a variety of platforms (particularly print and online), and whose content consists of multiple course and/or grade level groupings. The aim is not to promote this particular single source application of XML per se, but to use this example as a basis for rethinking the *practice* of curriculum development.

Marking Up from a Single Source: Using XML

The first practical and educational challenge for repurposing curriculum for the Web arises from the process of rethinking how curriculum content can be effectively restructured for Web delivery in ways that exploit the medium. One reason for marking up a curriculum document using XML is to fully develop the document as a learning object that can be made more accessible, dynamic, and repurposed to suit a range of uses, audiences, and outputs.

XML is widely used in areas such as digital publishing (Kasdorf, 2003). It is a customisable text-based markup language that enables the developer to construct her/his own specialised markup to transmit formatted data (Bray, Sperberg-McQueen, Maler, Yergeau, & Cowan, 2004). XML is used to encode and structure information from one source. It enables the format of curriculum to vary according to how it is accessed and who is accessing it. XML standards are open and internationally recognised. As an "extensible" markup language, XML enables those responsible for maintaining, editing, and marking up the document to determine their own markup vocabulary that makes sense to them. A single source of curriculum content is created as a single raw XML source file that is used for generating all forms of output (e.g., HTML for the Web, PDF for print).

Repurposing a curriculum document using this approach involves several basic steps: firstly, the curriculum is authored using a standard word processing package, such as MS Word. The development of this kind of integrated approach begins with the identification of suitable and appropriate curriculum document. Basic styles (e.g., for topic headings) are formatted in this document, which is marked up using some form of XML editing software. (XML editing software is available that plugs into common word processing applications). The document is then structured and tagged according to a document type definition (DTD). This modular DTD serves to define the XML elements to be used. This separate file functions as a kind of template for the XML source, defining the order and structure of the curriculum. General purpose DTDs, such as DocBook, are freely available. It states what elements must be present and which ones can be optional, their attributes, and how they relate to each other. The XML document containing the curriculum guide must conform to the DTD to ensure that the document will be displayable in a given format (Web, print, etc.). This process of validation ensures that the document has followed the DTD structure.

The "raw" single-source XML document generated at the end of this process serves as the source for printed, online, and other versions as necessary. This XML source file not only contains the raw content of the curriculum guide, it also contains metadata; that is, attributes and values identifying further information about the content, such as authorship details, the version, subject area, course details, and so forth. Customised tags and metadata are used to break the curriculum document up into modules or "learning objects" that can be updated on a regular basis. More sophisticated metadata describes how components of the content appear and relate to each other online. For example, metadata could be included to enable different sections of the curriculum to appear online according to the user's level assessment or enrolment status. The database driving the Web site is programmed to locate these tags and present the data accordingly. Metadata can be added to enhance the online functionality of curriculum. Key words, phrases, and headings can be linked to other online resources.

Finally, this source XML file is transformed to a format suitable for viewing on the Web and a suitable printing format (e.g., PDF) using two separate extensible style sheet language transformations (XSLT). An XSLT script is used to transform the XML to XHTML for rendering on the Web. During this process, each XSLT applies style sheet rules that determine which parts of the source content are appropriate for the output. An online version of the curriculum guide, for example, may include a short video introduction to students that is fully incorporated into the online version of the curriculum guide, but cannot be included in the printed version. The DTD and XSLT script can

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