Making and Managing Metadata

Open Educational Resources (OERs) and Metadata: The Future of Textbook Access and Usability

By Tom Adamich

This column focuses on open educational resources and their role in education. Open educational resources (OER) are, typically, educational materials which originate in a digital environment and are utilized in a similar educational environment (i.e., online learning).

What are OERs and Why Use Them?

According to the report issued by Educause, a nonprofit association whose primary mission is to advance higher education by promoting the intelligent use of information technology, OERs are resources that are available at little or no cost for use in teaching, learning, or research. These resources are available in a variety of formats and may include digital textbooks, instructional readings, simulations, games, motion media, and more. In addition, most OER content, adhering to the “free or nearly free access” terminology, is released in an open access and open use environment, with the creator(s) holding property rights under a Creative Commons or similar license that encourages open use or adaptation of the content.

Other aspects of the OER’s digital origins and structural adaptation potential are their inherent modular nature, which promotes the identification and utilization of their component parts. This dynamic aspect of the OER enables educators, instructional designers, and the students themselves to adapt the resources to meet changes in academic requirements, differences in teaching delivery methods, and promote the use of the resources by independent learners, as well as those in traditional educational settings, including instructor-led face-to-face, blended, and online instruction.

OERs also have the potential to significantly lower the costs associated with traditional textbooks and other educational resources (particularly those formats mentioned that are used in higher education) for both students and educational institutions. According to Baumann in “E-books: A New School of Thought,” the average public university student spends $1,222 on textbooks (as part of the nearly $26,273 the same student spends annually to attend a public four-year college or university).

Another big advantage of using the OER, compared to a more traditional educational resource, is its modular structure – that ability, as mentioned earlier, to be utilized as a part or piece in order to address a specific educational need or effectively represent a particular concept. Such multipurpose use of an OER’s component parts (also known as learning objects) has been shown to enhance an instructor’s ability to promote the widespread use of formative assessment. Formative assessment is defined by Cowie and Bell as the bidirectional process between teacher and student to enhance, recognize, and respond to the learning through the use of formal and informal assessment procedures. Thus, both students and educators have access to a multitude of instructional elements (and the rights to use them in many cases) within the structure of one OER.

OER Digital Repositories: Where Are They? What Do They Do?

At this point, the theoretical relationship between the uses of OERs to support formative assessment in the educational context has been established. However, as with education’s use of formative assessment-based teaching elements, the question arises, “How does one effectively and quickly identify and locate OER-based instructional materials which teach specific concepts? The simple answer to that question is to use OER metadata.

The widespread utilization and accessibility of the Internet offers the potential to widely distribute OERs as well as their descriptive metadata. Before examining OER metadata in detail, I will consider where many OER currently reside.
and can be accessed. Several successful OER repositories are operating internationally. For the purposes of this column, two U.S.-based OER repositories are featured. In each case, OER metadata serves as the primary source of contextual evidence and validation.

**Orange Grove (Florida Distance Learning Consortium)**

Developed in 2004, the Orange Grove (www.theorangegover.org) is the standards-based K-20 OER/learning object repository for the state of Florida. Susie Henderson, associate executive director of the Florida Distance Learning Consortium, works with 39 post-secondary institutions in Florida to leverage resources, facilitate statewide communication and cooperation, and develop beneficial statewide OER initiatives. Henderson also serves on and chairs regional and national committees in the U.S., such as the advisory board of the Academic Advanced Distributed Learning (ADL) Co-Lab in Madison, Wis.; the OCLC e-learning committee; the Southern Regional Education Board’s (SREB) Distance Learning Policy Laboratory; and SCORE Project (Shareable Content Object Registry for Education).

During a recent phone interview, Henderson elaborated on some of the overall design details of the Orange Grove as well as some of the key information discovery decisions (particularly those which are metadata-related). One of the hallmarks of the Orange Grove Digital Repository is its collaborative relationship with both the Southern Regional Education Board (SREB) and other Digital Repository projects. The Orange Grove provides access to OER held in MERLOT (Multimedia Educational Resource for Learning and Online Teaching—California State University), Global Text Project, and Connexions (discussed below). It is this promotion of interoperability (with respect to content and access to materials) that makes the Orange Grove Digital Repository one of the leading OER digital repositories in the U.S. Another hallmark of the Orange Grove is its implementation of a standardization of common course numbers for Florida-based higher education courses and a core open access text development process that accelerates the universal adoption process for any OER text developed by faculty working at one of Florida’s universities or community colleges.

**Connexions (Rice University)**

Like the Orange Grove, Connexions (http://cnx.org) is a digital repository of OERs. Based at Rice University in Texas, it was begun in 1999 by Rice University faculty members Richard Baraniuk, Don Johnson, Bill Wilson, and Sidney Burrus. Connexions is a global repository of shared content. Professor Don Johnson suggested the project be called Connexions. Consistent with the OER definition presented above, modularity and adaptability (via Creative Commons licensing) are featured aspects of Connexions collections, which are organized in small modules (i.e., learning object(s) and the smallest teachable parts) that are parts of larger collections (schema). Thus, Connexions discovery descriptions are equally modular and adaptable. It is this adaptability of content (found in both Connexions and the Orange Grove) that further promotes the OERs’ use as a key element of successful “materials-to-information goal/objective” focus associated with most information seeking and evaluation endeavors.

**OER Metadata: Interoperable Aspects**

Now that we have identified where OERs in the U.S. are found, that they contain associated metadata, and are designed to be used either in their entirety or in segments, let’s examine OER metadata in greater detail to get a glimpse of what users access when they conduct a search in an OER digital repository database.

The following metadata, found in the Orange Grove Digital Repository, is associated with the resource *Worldwide Differential Calculus*.

**Worldwide Differential Calculus**

**Collection**

Open Textbook Resources

**Description**

The book authors state they emphasize intuitive ideas in conjunction with rigorous statements of theorems, and provide a large number of illustrative examples. They include proofs, or sketches of proofs where they think helpful, but the more technical proofs are contained in the appendices (the “Technical Matters” sections) to chapters. The text assumes ... (continued on page 12)
Making and Managing Metadata

Open Educational Resources (OERs) and Metadata: The Future of Textbook Access and Usability

(continued from page 11)

Links To Resources
Worldwide Differential Calculus File: ww_diff_calc.pdf (12.6 MB)

Author/Creator
(Digital Rights Manager)
David B. Massey, Worldwide Center of Mathematics

Author/Creator (Digital Rights Manager) Details
http://www.centerofmath.org/DBM/, info@centerofmath.org

Creator
Massey, David B.

Role
Author

Publication/Creation date
2009

Full Description
The book authors state they emphasize intuitive ideas in conjunction with rigorous statements of theorems, and provide a large number of illustrative examples. They include proofs, or sketches of proofs where they think helpful, but the more technical proofs are contained in the appendices (the "Technical Matters" sections) to chapters.

The text assumes students are familiar with high school algebra, analytic geometry and graphing in the xy-plane, basic properties of trigonometric (trig) functions (in degrees), and basic properties of exponents and logarithms. They define circular trig functions and radians in Section 2.7, dekolarithms in Section 2.5, and inverse trig functions in Section 2.9. However, in these sections, they concentrate on the derivatives and graphs of the functions, not on algebraic properties.

Keywords
Rates of Change and the Derivative, Basic Rules for Calculating Derivatives, Applications of Differentiation, Anti-differentiation & Differential Equations, Parameterized Curves and Motion, Mathematics, Calculus

Language
en-US

Requirement Name
Adobe Reader. To view embedded videos, an Internet connection and browser and an mp4 player such as QuickTime are needed.

Interactivity type
Expositive

Learning resource type
Exercise, Figure, Graph, Lecture, Narrative text, Textbook

ERIC Thesaurus Terms
Calculus

GEM Subjects Terms (K-12)
Mathematics/Calculus

Rights information
Worldwide Differential Calculus by the Worldwide Center of Mathematics, LLC, is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 United States License. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-sa/3.0/.
You are free to copy, distribute and transmit this work and to adapt this work if you attribute authorship and use the work for non-commercial purposes. If you alter, transform, or build upon this work, you may distribute the resulting work only under the same or similar license to this one.

According to the “Comparison of Metadata of THECB [Texas Higher Education Coordinating Board] and Other Learning Object Repositories,” the Orange Grove Digital Repository uses the aforementioned Southern Regional Education Board’s SCORE documentation. SCORE is based on the Institute of Electrical and Electronics Engineers (IEEE) Draft Standard for Learning Object Metadata (LOM) – a Dublin Core derivative – and uses IEEE LOM and Gateway to Educational Materials (GEM) controlled vocabularies as sources for subject terms.

Notice how the different components (e.g., graphs, sketches) of the resource are listed in the example. As with all OERs, these resource elements have the potential to function as independent units (with associated metadata). Also, notice the prominence of the Creative Commons (CC) metadata for the resource and its function as a guide for the user, who may wish to use the resource in its entirety or adapt portions of it to create a new resource – one that also should be distributed either under the same resource’s CC license or a similar one. This spirit of no-cost (or low-cost) access, easy adaptation, and usability highlights the advantages of using OERs, and reinforces the importance of their associated descriptive metadata as both a guide for structural use and as a guide for educational use.
Future Trends and Concepts

The widespread use of information-based technology tools by people ages 12-24 and the desire to use those tools successfully in online environments will lead to continuing development of OERs. The demand for rapid retrieval of low-cost (or no-cost) relevant instructional materials, which support both content and pedagogical goals and objectives, including the use of formative assessment techniques, continues to grow. Whether or not the academic community can completely grasp OERs’ modular aspects (particularly those associated with creating new, derived resources from the original OER) remains to be seen. Yet, growing evidence that such liberal control of instructional resources as described in OER’s metadata and seen in OER repositories suggests that it is not only necessary but essential to the success of instructional materials development and utilization in the future.

References

4. The Orange Grove, Our Team, Suzy Henderson [brief bio], www.theorangegrove.org/people.asp (access July 9, 2010).

Part 1 of this topic told of my investigation concernng the preference for codex-format books or e-books by acquaintances and people I met while traveling through five provinces in the eastern part of Canada during the summer of 2010. This does not mean all of the respondents were Canadians; many were Americans. I estimated these people were members of the middle class with most responses from the 40-65 age group followed by the 65-plus age group, and much fewer from the 20-40 age group; women were 52.8 percent of the respondents. A little less than 22 percent were e-book readers or intended to read e-books at a future time. Librarians were slightly more disposed to e-book use with 28 percent either e-book readers or planning to become so.

Many respondents sent more than just answers to my questions

(continued on page 14)