

Learning Object Reusability: What Does It Really Mean to Faculty and Faculty Support Personnel?

Hal Schlais

Senior Consultant for Learning Technology Development
University of Wisconsin System Administration

Patricia Ploetz

FIPSE Project Director, Academic ADL Co-Lab
Senior Information Processing Consultant, University of Wisconsin Stevens Point

The POC Project Overview

During the summer and fall of 2003, a multi-campus project in the University of Wisconsin System entitled *Applying Advanced Distributed Teaching and Learning to Pre-Calculus Mathematics* was conducted as a proof-of-concept (POC).¹ The project examined a learning object model designed to address pre-determined teaching objectives in pre-calculus. Among the aspects examined by this project was the assessment of faculty development issues particularly as they related to locating, repurposing, sharing and using existing National Science Digital Library (NSDL) and other digital content. This paper outlines some of the results of that experience.

Seven members of mathematics departments from the University of Wisconsin Colleges and the University of Wisconsin-La Crosse collaborated in the project. Their goal was to enhance traditional face-to-face classroom instruction by first identifying teaching objectives (“choke points” in the vernacular) and then find, repurpose and share learning materials that they felt would improve instruction in those areas. Moreover, these materials were to ultimately become shareable content objects (SCOs) that conform to the SCORM specifications for content interchange making them not only accessible to the NSDL but also uploadable to SCORM conformant Learning Management Systems.

Stated objectives of the POC were to produce: 1) two Precalculus modules assembled by faculty involved in the project, 2) a prototypical process other faculty would subsequently be able to use for creating SCOs for classroom instruction, 3) a prototypical collection of SCOs identified from existing precalculus content in digital mathematics collections appropriate to the two modules created, and 4) a case study of participant experiences. An unstated but related research issue emerged around the usability of The National Science Digital Library, MERLOT, the Eisenhower National Clearing House, and other digital repositories and referatories. An index to further resources including some examples and the repository URL is at http://www.uwsa.edu/nsf_poc

Curricular Focus

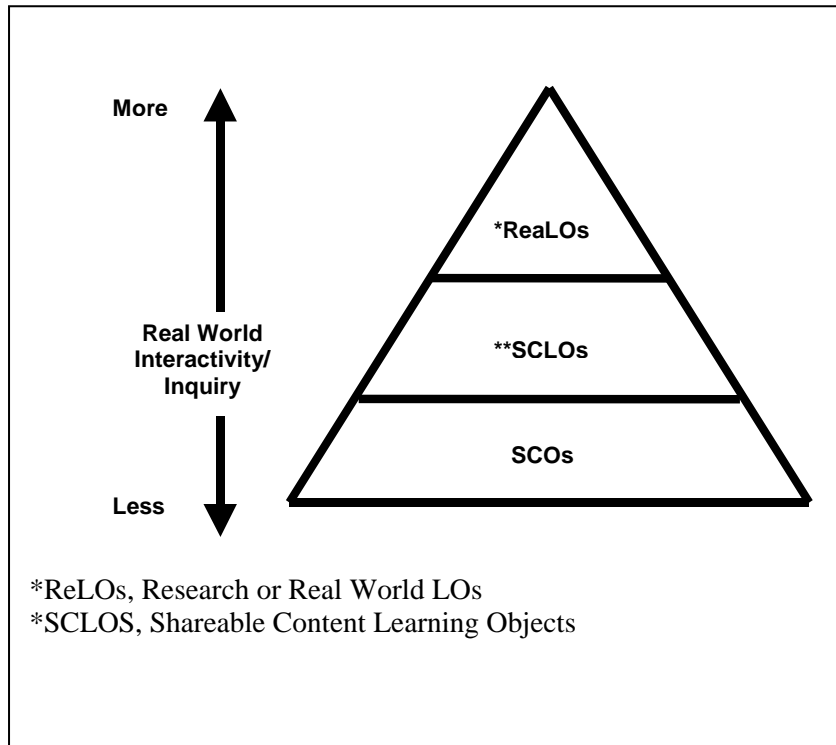
Members of the participating mathematics departments were polled as to their perceived “Choke Points” – topics they felt were instructionally problematic but that they perceived might be addressed with a technological approach in pre-calculus instruction. Four areas were identified and a search conducted for appropriate materials. The project participants conducted extensive searches of the existing digital libraries. Ultimately, some 8 different learning objects were assembled and placed in the prototypical repository. This content was quite shareable but they were not SCOs under the strictest definition of SCORM. To differentiate these, we came to refer to them as SCLOs, Shareable Content Learning Objects.

¹This project was supported in part by a National Science Foundation Proof of Concept Grant: DUE-0231508 and a grant from the University of Wisconsin System Curricular Redesign Fund.

Instructional and Systems Design

Early on, the group settled on a common vision for the creation of content that we came to call TCP. That is, each of our SCLOs would have a Textual, Conceptual, and Practical piece. This resulted largely because we observed that predominantly the digital materials located usually had these components and this framework was quite appropriate to our instructional environment. To facilitate both a common look and feel of our SCLO products and our content production we created an early HTML template.

Digital Content



A consensus opinion was that, while usually being quite well done, often, downloadable materials could not be disassembled, edited and the resulting components reassembled for use in contexts more appropriate to the current pedagogical needs. This meant, for example, that a very useful animation or interactive applet could often not be disaggregated from its context and repurposed into a new context. Even more problematic was that this would prevent faculty from making changes in the text (the T of TCP) to present the content from a slightly different or totally new

perspective. Based on an ISD assessment process, the prototypical HTML template has been revised as a DreamWeaver® template around usability and accessibility issues.

Some Further Observations

- During the searches of the existing digital libraries conducted by participants, the consensus was that materials were most easily found using Google as opposed to the search engines on the repository sites themselves.
- The collections themselves were not focused around curricular goals, i.e., something as focused as pre-calculus.
- While a stated goal of the POC was not to create new materials, there was a need to create some appropriate “GIZMOs”, interactive applets, flash and other animations allowing for open-ended exploration.
- SCOs as strictly defined under SCORM were more directed at training and can be very useful. Examples here might include certain laboratory experiments. However, we feel that the strictest SCORM requirements for SCOs are not flexible enough to be useable in more general instructional settings. For example, the “Golden Rule” of SCORM (ANTA) is that SCOs be entirely self-contained and interact only through a learning management system. This clearly limits the flexibility of SCOs. E.g., this requirement restricts links to external databases and clients. Allowing such links in turn creates an environment

suitable to more realistic, open ended, or real time learning objects. Examples might be sequencing databases or server-side applications that do more sophisticated mathematics.

Research Design Model

To examine some of the faculty development issues the participants were divided into two groups -- Four of the POC faculty, two from each participating institution and the PI took part a summer SCO workshop produced as part of the professional development program at the Academic ADL Co-Lab (<http://academiccolab.org/>.) This 5-day workshop included an introduction to: ISD, SCO and SCORM technical aspects; software enabling content aggregation and meta-tagging; and an overview of issues to access to and storage of SCOs in standards based repositories. Three other participants formed a small control group and received an abbreviated overview from the summer participants through departmental interactions in the fall at the beginning of instruction. All participants received a one-course release in the fall semester to allow them to use and assess the materials created.

Case Study Observations

A case study involving project participants, classroom testing of content and an assessment and revision of the ISD model were conducted. These are located at http://www.uwsa.edu/nsf_poc

- Faculty were not successful in incorporating SCO concepts in their teaching if they
 - Were not part of an organized training session
 - Didn't consider themselves technologically capable
 - Lacked a support structure for a day-to-day activities related to content development
- There was no mechanism extant allowing the developer to share completed content effectively. Our group of seven mathematicians found it problematic if not impossible during the POC to
 - Apply metadata standards
 - Find an effective method to share the content with NSDL
 - Easily save content objects to a repository

Lessons Learned About the Content

If SCLOs are to become much more widely used to enhance classroom instruction we think that:

- GIZMOs play an extremely influential role in the encouragement of faculty use. These must be available in repositories as finished classroom exercises and freely shareable both as working modules and as modifiable source code
- The content created using GIZMOs must be easily disassembled into constituent parts for modification (something like our TCP.) In particular, faculty are inclined to want to make the textual presentations around conceptual and interactive software more their own.
- Libraries must become much more involved in the repository development process. The process of moving created content to a repository is not a normal workflow process for faculty. Attaching metadata is not a common or standard process for faculty and they are not likely to do complete nor appropriate jobs. It may well be that a "local" version similar to MERLOT should be adopted. This library model, would have servers administered by the campus library; faculty encouraged to work with their librarians save and catalog their content on the local campus server; and the greater collection of these across a state or region, for instance, would be tied together with a registry software maintained centrally. This registry software would, in turn allow access to the NSDL.

Conclusion

If the use of SCLOs to enhance day to day classroom instruction is to become widely adopted, we feel that several components need to be in place: instructional staff must have training, tools, and support, there needs to be an overall adoption of a more repurposable model for digital content and libraries

must become involved in new ways. The training component is least problematic but will need to be restructured around ISD aspects enabling faculty to effectively develop in a SCLO environment. Faculty will need to use some web development tool in much the same way they use word processors or email. The process of creating content must be as close to a cut-and-paste metaphor as is possible, including an easy-to-use template for content creation. Secondly, repositories of reusable GIZMOS focusing on particular curricular areas should be developed. This is a national responsibility. With fairly straightforward editing skills and templates, these objects can be adapted and included into electronically shareable classroom instruction in a much more efficient manner. And finally, none of this moves forward if the content is not shared widely across disciplinary communities. This depends on creating a distributed library model that functions locally, interacts with the NSDL and other digital libraries, and is searchable by Internet search engines. This means that a regional institution (our System office for instance) must take central responsibility for creating a registry, a work flow process around faculty content saving needs to be in place at the local campus library, and the library must take a responsibility for technical details of registry of the content and accuracy and appropriateness of the metadata.

References

Advanced Distributed Learning (2003) *Sharable Content Object Reference Model (SCORM) Version 1.2*, Advanced Distributed Learning Inc. Retrieved June 1, 2004 from <http://www.adlnet.org/index.cfm?fuseaction=scorm12>

Final Report and Recommendations; VET Learning Object Repository Project, © 2003 Australian National Training Authority, (ANTA) Retrieved June 1, 2004 from <http://flexiblelearning.net.au/projects/learningobject.htm>

Biographical Sketches

Hal Schlais is currently the Senior Consultant for Learning Technology Development at the University of Wisconsin System Administration. He is a former mathematics professor who for the past several years has been working with faculty development in learning technology with in the UW System. He was the PI on the NSF POC grant referenced in the paper. He is currently focusing on repository structure issues related to the scaling of the use of science and mathematics related digital content for classroom instruction in higher education

Address: 1648 Van Hise Hall
1220 Linden Drive
Madison WI 53706

E-mail: hschlais@uwsa.edu

URL: www.uwsa.edu/olite

Phone: 608.265.5362

FAX: 608.263.3175

Patricia Ploetz, Senior Information Technology Consultant at the University of Wisconsin Stevens Point, and Project Manager for the FIPSE Grant “An Investigation of Pedagogical and Economical Effectiveness of Shareable Content Objects, Using Standards in Online Instruction is the case study researcher for this NSF-POC. Patricia is currently completing her doctoral studies in Education Technology at the University of Wisconsin Madison. Patricia has been involved in a number of local and state wide initiatives in educational technology and for the past eight years has worked as the coordinator of instructional technology at the University of Wisconsin Stevens Point.

Address: Academic ADL Co-Lab
5901 Research Park Blvd.
Madison, WI 53719

E-mail: patricia@academiccolab.org
URL: <http://projects.aadlcolab.org/fipse-publicweb/index.htm>
Phone: 608.261.1120