Creating Flexible E-Learning Through the Use of Learning Objects

The University System of Georgia deconstructs existing online courses to create separate files of reusable content

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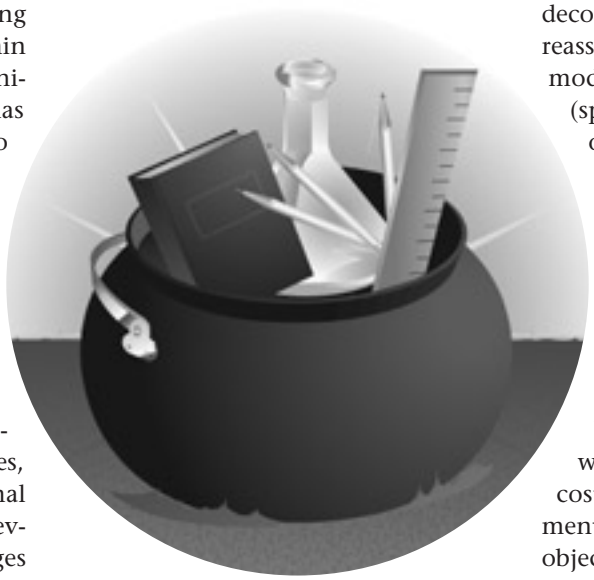
For five years, Advanced Learning Technologies (ALT), a unit within the Board of Regents of the University System of Georgia (USG), has worked with faculty and staff to develop the eCore, an electronically delivered core curriculum for the University System of Georgia. The eCore contains courses leading to the completion of the first two years of an undergraduate degree.

The ALT unit is also charged with assisting faculty and staff in using technology successfully, creating meaningful learning experiences, and expanding access to educational opportunities and resources. ALT leveraged eCore to meet these challenges by making the eCore courses available for faculty to reuse in developing their own face-to-face and online courses. In 2000, we began making these courses available on a Web site called SCOUT—Sharing Content Online for University Teaching. Stored in the WebCT Campus Edition course management system, courses were available only in their entirety. While this proved a good first step for content sharing, faculty members had to take an entire course even if they wanted just a single element, making the content somewhat cumbersome to use. They had to navigate through the course in linear fashion to find the text, images, graphs, charts, or clips they wanted for their own courses, as there was no efficient way to search a course or collection of courses for specific resources.



While faculty response to SCOUT was encouraging, feedback indicated that what they really needed was a quick way to find specific pieces of learning content so that courses could be custom designed. In addition, faculty wanted to use course content across disciplines (for example, using a history lesson on Romanticism in an American literature course). To meet these needs, ALT had to find a way to make the different course elements easily available to faculty. In simple terms, ALT wanted to provide a level of search efficiency analogous to when the telephone company Yellow Pages started listing physicians by specialty rather than just alphabetically.

Transition to Learning Objects

In February 2003, ALT began a pilot project with the specific goal of deconstructing the eCore courses and reassembling them into smaller, more modular components of instruction (specifically, learning objects). For our purposes, we use the definition of learning objects offered by David Wiley as "any digital resource that can be used to support learning."[1] We chose to store the learning objects in WebCT Vista, since it was the course management software already in use throughout the USG. Through these two actions, we believed we could decrease the cost and time of course development by making hundreds of learning objects available to faculty throughout the USG.

One of the first decisions we made concerned the level of granularity for the learning objects, since faculty would find and retrieve them by browsing sections of course content in specific topic areas. Labeling and organizing the learning objects so that faculty could easily search, retrieve, mix, match, reuse, and assemble these components into entirely new online or offline courses was crucial for success. Based on the WebCT Vista functionality and the type of content available in the original courses, we organized learning objects as groups of content pages concentrated around specific learning objectives and stored in topic areas. We organized the content related to topic areas in Vista learning modules. A table of contents on the left of the learning module screen lists all the

content pages addressing a particular learning objective. The last item in the table of contents is a link to download the contents for that particular learning objective.

Deconstructing courses and reorganizing them as learning objects was technically straightforward and did not require buying a special digital content repository or any other new software. To deconstruct a course, we copied an existing course template in Vista. We then rearranged the individual pieces of content from the original course into a hierarchy consisting of learning objects that fall under learning objectives organized by topic. The key to accomplishing this process simply, efficiently, and affordably was to build this scheme not as a separate hierarchy in separate software but from the software's perspective, as a new content template in WebCT Vista course spaces.

Instead of navigating to a course, faculty members navigate to a course section in Vista, such as Precalculus Learning Objects. Instead of the first page welcoming visitors to Jane Smith's precalculus **course**, the welcome page is an introductory screen to topics rather than lessons, for example, "Equations" instead of "Lesson 1: Equations."

Clicking deeper into "the course" brings up learning objectives from the original equations lesson. Clicking on an objective brings up learning objects, which are groups of content pages that map to the objective. This approach means that any institution with a course management system can do what we've done and make learning objects available to faculty without additional software investment. And since WebCT Vista is SCORM compliant, we can share our courses with any SCORM-compliant system.[2]

Now, faculty looking for learning objects related to equations, for example, no longer have to navigate to the precalculus course and wade through it from start to finish. Faculty come to the faculty portal, click on a topic, and find a set of learning objectives as well as learning objects that fulfill them. For example, they can navigate to a subject (such as Precalculus), choose a topic (Polynomials), select a learning objective (Recognize a function as a Polynomial Function), and view all content, including text and media, that addresses that learning objective.

To download a learning object, faculty use the course management software's assignment tool and point and click as if they were students downloading an assignment. Prompted by Windows, they save the object to their hard drives or a new course area.

We label every learning object with a metatag to make it even more searchable. If a history professor wants images of presidents for a handout, she can query courses for images of presidents. Using the Media Library in Vista, we've also set up areas that organize learning objects by media type. All animations and simulations (images and graphics) are available for browsing individually rather than only in context in the course content.

After work on the prototype was completed in late July 2003 and faculty provided positive feedback, we outsourced technical work on 20 courses to a private consultant. Although the deconstruction work isn't complex, it is time-consuming. By the end of August 2004, 16 of the original eCore courses will be deconstructed and reconfigured as learning objects.

A Repository for Version Control

In addition to downloading the materials for reuse, the learning objects—which are stored in a centralized content database—can be made available to departments and users across the system or institution based on predefined rules or permissions, including user roles. This eliminates the need for duplicate copies of the materials and ensures that the most accurate version of the content can be automatically distributed across courses.

Faculty now have a variety of options for developing new online courses or supplementing face-to-face courses. When they attempt to reuse content, they're not locked into a course/unit/lesson format. They have the freedom to develop their courses as they like without starting from scratch.

Surprisingly, what began as a plan to provide courses as learning objects—a big undertaking—has become something even bigger. A faculty portal called FacultyVIEW[3] has emerged to provide storage and sharing of reusable learning objects and instructional design resources, an active community of scholars, and an avenue for announcements and upcoming events of interest to USG faculty and staff.

One of our goals moving forward is to perform a return on investment analysis on the project so that we understand how much time and money we are saving in course development. We will document the comparative effectiveness of courses that incorporate learning objects. Although we lack a current analysis, we believe the project will produce better courses more quickly and efficiently, especially as the learning object exchange model scales to encompass higher education on a national and global scale.

Lessons Learned

We're pleased with the project and have learned lessons along the way that may help other institutions pondering the same move.

- *Plan:* Identify teams, processes, timetables, and milestones and review procedures in advance. Anticipate that the project will take longer than you think.
- *Distill:* Consider granularity up front. We chose two levels of granularity based on our materials and the advantages offered to us by the program already in use—learning objectives and media components—on which to anchor our course transformation. Organizing learning objects around the learning objectives they map to works for us; it is straightforward in empirical courses such as math and science, but can be complex with more abstract subjects such as history and communications.
- *Design:* The quality of a course's instructional design will dictate the

success of object-to-objective linking. Ideally, you will find at least one learning object and assessment per objective. Unfortunately, it doesn't always work out that way. Even in well-designed courses, you may find learning objectives with no content to back them up. We're also applying what we've learned in deconstructing courses to support effective online instructional design for new courses.

- *Describe:* Every learning object needs a name of its own. Files in WebCT Vista can't have duplicate names or title tags. When you start your project, you'll likely find a host of files named "introduction" and "chapter 1." One of the most important things to do is to enforce a naming scheme that conveys the course, the topic, and the learning objective and that provides a name referring to the lesson (for example, precalc_equations_01_polynomials).
- *Research:* Make sure your faculty are ready, willing, and able to take advantage of learning objects. We tested the precalculus pilot prototype with a small group of faculty who responded enthusiastically. With that faculty feedback, we confirmed we were on the right track and could proceed with the rest of our courses.
- *Market:* Faculty need consistent reminders that learning objects are available and that the benefits of using them can be significant. It is important to market the merits of learning objects to faculty regularly.

Taking these steps will dramatically increase your chances of success with learning objects. Best of all, successful use of learning objects translates into increased faculty productivity and new, higher-quality educational opportunities for your students. e

Endnotes

1. D. Wiley, *The Instructional Use of Learning Objects,* D. Wiley, ed. (Bloomington, Ind.: Agency for Instructional Technology and Association for Educational Communications and Technology, 2002), <http://www.reusability.org/read/> (accessed September 8, 2004).
2. SCORM stands for "Shareable Content (previously Courseware) Object Reference Model," a set of technical standards that permit Web-based learning systems to find, import, share, reuse, and export learning content.
3. To view public portions of FacultyVIEW, please visit <http://www.alt.usg.edu/projects/facultyview/index.html> (accessed September 8, 2004).

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