Learning Object Based Instruction

Alex Stone
VLN Partners, LLC., USA*

INTRODUCTION

Imagine a vast repository of digital materials that includes an unlimited supply of instructional videos, interactive multimedia exercises, links to Web sites, reading exercises, recorded interviews with experts, interactive graphs, charts, diagrams, photographs and maps—and nearly any other form of digital instruction—all organized according to academic standards, instructional objectives, and specific topics addressed. Teachers could log in to the repository via the Internet, type a simple search string and instantly access hundreds of pertinent instructional sequences that they could use to enhance their teaching practices in both the classroom and in the virtual learning environment. This vision has been the driving force behind a form of instructional technology called learning objects (LOs), and it is becoming an increasingly relevant topic within the field of instructional technology today.

The idea that instructional content can be systematically encapsulated, retrieved, transmitted to others, and then reused is the driving force behind the LO movement. In the face of such enormous potential, the field of instructional technology has made little progress since 2002 when it comes to defining a practical method for populating LOs with meaningful instructional content and research that addresses the pedagogical effectiveness of using LOs in the K-12 learning environment is scarce. As yet, no practicable model for implementing this technology in a "real world" setting exists.

BACKGROUND

Perhaps the most widely accepted definition of the term learning object comes from David Wiley (2002). Wiley (2002) states that a learning object is any digital resource that can be reused to support learning (p.7). While Wiley's definition and other attempts to define the true nature and function of learning objects are important efforts, varying views regarding the true nature and function of learning objects have caused a great deal of confusion within the field of instructional technology concerning this technology (Sosteric, 2002; Welsch, 2000). In any event, the fundamental theme that ties every perspective together is the basic idea that digital instructional content can be encapsulated, stored, and reused in the appropriate context. To put it more succinctly, learning objects are reusable and interoperable. These core attributes make learning objects both appealing and controversial.

The term "learning object" appears in the vernacular sometime around 1994 and is often attributed to the work of Wayne Hodgins (Wiley, 2002, p. 4), but the basic concept of reusing digital resources to streamline computing practices for programmers and to introduce uniformity of experience for end-users can be traced back to the work of Ole-Johan Dahl and Kristen Nygaard from the Norwegian Computing Center, Oslo, Norway, in the mid 1960s with their work on a programming language called SIMULA. This work led to a form of computing called object oriented programming that has had a profound impact upon the field of computer science and information technology. Object oriented programming gained momentum in the 1970s with the work of Alan Kay and became increasingly popular as a result of the work conducted in the 1970s and in the early 1980s by Bjorn Stroustrup with his efforts to apply the basic concepts of object oriented programming to the C computer language to create the commercially successful and widely accepted C++ computer language. Soon after that, a group at Sun led by James Gosling introduced a derivative of C++ called Java that has gained increasing popularity with the expansion of the Internet.

While the effective implementation of learning objects (LOs) will undoubtedly continue to require formative input from the field of computer science, the fields of instructional technology and education will need to add more formative input to the conversation if LOs and learning object based instruction (LOBI) are to reach their full potential. To date, the majority of work concerning LOs has been focused upon establishing metadata referencing and retrieval schemes that can be used to quickly access LOs. In the 1980s and early

1990s, several metadata referencing initiatives began to address the need to categorize and quickly retrieve digital content and various tagging schemes began to emerge. In the fall of 1997, the U.S. Department of Defense, the White House Office of Science and Technology, the Department of Labor, and others, kicked off the Advanced Distributed Learning (ADL) initiative that established the metadata referencing standard called the Sharable Content Object Referencing Model (SCORM). Since it was introduced, SCORM has come to be the most prominent metadata referencing standard in the United States, but other metadata standardization efforts—like the IEEE's LOM project—also address the same need.

The introduction of, and further refinements to metadata referencing standards like SCORM and LOM are a critical step that must be taken to allow different content publishers to create learning objects that can interoperate within different learning management systems (LMS), but these efforts have little or nothing to do with pedagogical effectiveness of the LOs themselves. These efforts were an important first step because they addressed the need to ensure that LOs are retrievable and interoperable, but they do not address exactly what instructional materials a LO should contain to be instructionally effective (Welsh, 2002, p.2).

The first attempts to address the need for LO content standards are typically attributed to the work of M. David Merrill from Utah State University in his work in the 1990s. Other early pioneers in the effort to devise a content model for LOs include L'Allier (1997) and his efforts with the NETg Learning Object Model and Barritt (1999) and others from CISCO who introduced the RLO/RIO content models. Verbert and Duval (2004) present a thorough overview of such efforts.

In 2002, Macromedia released a white paper that clearly identifies SCORM as a referencing standard only and acknowledges the fact that

the intent of SCORM is not to promote uniform content, but to enable conformant content to work better in a technical level. What content goes into the Learning Object (LO) is determined by the learning designer and not governed by SCORM. (p. 4)

Other efforts at around the same time, like The Masie Center's white paper (Masie, 2002), the Learnativity content model (Duval & Hodgins, 2003), and the SCORM content aggregation model (Dodds, 2001) all attempted to meet the demand for a content model that addresses the actual instructional media contained within an LO. Despite these early efforts, the confusion between the function of SCORM and how it does (or more appropriately, does NOT) affect the content of a LO remained—and it is still present today. Soon after this flurry of activity, the collective attention of the field of instructional technology moved toward the formation of LO repositories and the issue of how best to populate LOs with instructional content still needs to be addressed in a practicable way.

Much of the recent activity in the LO community has been devoted to building LO repositories like MERLOT,

Table 1. Partial list of existing LO repositories

Organization	LO Repository Name	URL
California State University	Merlot	http://www.merlot.org/Home.po
Discovery Education	Cosmeo	http://www.cosmeo.com
EduSource Canada	Canadian Network of LO Repositories	http://www.edusource.ca/
European SchoolNet	Celebrate	http://www.eun.org/eun.org2/eun/fr/Celebrate_LearningObjects/entry_page.cfm?id_area=1008
The Remediation Training Institute, Inc.	ExtraLearning	http://www.extralearning.net
The Monterey Institute for Technology and Education	The National Repository of Online Courses Hippo Campus	http://www.montereyinstitute.org/nroc/nrocworking.html http://hippocampus.org/
Utah State University	Instructional Architect	http://ia.usu.edu/
Wisconsin Technical College System	Wisconsin-Online	http://www.wisc-online.com/

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