

Chapter I

An Abridged History of Learning Objects

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Abstract

What follows is a short history of learning objects in both the academic, governmental, and corporate sectors. This is by no means an exhaustive list of events. The origin of the term will be traced from 1992, as Wayne Hodgins coined it, to the present. Key standards will be listed as they occurred, such as the sharable content object reference model (SCORM). In addition, landmark collaborative applications and repositories will be mentioned along with their intended mission. Corporate and academic interpretations of the term are noted and its use within organizations.

Introduction

Querying the words learning and object in a search engine will yield tens of millions of results. Constraining the search to the phrase “learning object” yields a few hundred thousand to just over a million results depending on the search agent. Results are likely to grow exponentially into the millions in the coming years. Amazingly, only three years ago there were tens of thousands of records. Several reasons for this staggering phenomenon are supposed:

1. The popularity of e-learning and the Internet along with the plethora of online communication technologies such as Web authoring tools, blogs, forums, and the like that allow almost anyone to create content and dub it as a learning object.
2. Ambiguity in its meaning, as a variety of individuals and entities has offered numerous definitions depending on the context in which it is used.
3. Reduced cost of production and rapid lesson development as the education arena shifts into technology-mediated instruction and away from traditional teaching-learning methods.

Additional explanations may be available; however, this chapter is concerned with the second reason and the understanding of the term learning object in its historical context. To divulge the forthcoming of the term *learning object*, a brief review of existing literature is necessary. To this end it is necessary to raise awareness of the various definitions and uses offered by a variety of scholarly works and trade publications.

Some selected applications of “learning object” in the literature are educational objects (Friesen, 2001), media object (Norton, 1996), knowledge object (Merrill, 1996), rapid learning object™, reusable learning object (Barritt, Lewis, & Wieseler, 1999), Oracle learning architecture (Ellwood, 1997), shareable courseware object (Dodds, 2000), shareable content object (Dodds, 2001), units of learning (Koper, 2001), e-learning objects (Collier & Robson, 2001), instructional object (Gibbons, Nelson, & Richards, 2000), intelligent object (Gibbons et al., 2000), and data object (Gibbons et al., 2000). Sometimes these terms are used interchangeably and at other times independently. The prolific usage of the coined term *learning object* is the most widely recognized of the variants. As such, its history is decidedly the focus of this investigation. What will follow is a brief historical listing of key events and publications related to this phrase and its inception into e-learning. This is by no means meant to be an exhaustive list.

The Timeline

1992

The term *learning object* is a fairly recent notion. Wayne Hodgins, a well-known e-learning expert and strategic futurist with Autodesk, Inc., is generally given credit for its penning. In 1992, Mr. Hodgins was watching one of his children playing with Lego [sic] building blocks while mulling over some problems regarding learning strategies. Wayne realized right there that the industry needed building blocks for learning plug and play interoperable pieces of learning. He termed those building blocks *learning objects* (Jacobsen, 2002). He defined learning objects as a collection of information objects assembled using metadata to match the personality and needs of the individual learner (Hodgins, 2000).

1994

A few years later Mr. Hodgins, now a former president of the Computer Education Management Association (CEdMA), established the learning architectures, APIs and learning objects working group (Polsani, 2003). This working group operates today as the learning architecture/learning objects (LALO) task force. Simultaneously a team was assembled by Oracle Corporation consisting of Chuck Barritt, Tom Kelly and several others to create a framework for converting computer-based training courses into a more flexible learning object authoring and delivery system.

While Oracle was still in the research and development phase, National Education Training Group, Inc. (NETg), a subsidiary of the Thomson Corporation, released a working e-learning application based on their interpretation of Hodgins' learning object model. NETg marketed their work under the trademarked term NETg learning object, or NLO (Barron, 2000). After researching this claim further, no active trademark could be located. There were, however, several applications filed. Regardless, NETg appears to have been the first business entity to market which was a remarkable feat considering that the Internet was in its neophyte stage.

1996

In January, the Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE) started with the financial support of the European Union Commission (ARIADNE, 2004). Their mission was to enable better quality learning through the development of learning objects, tools and methodologies that support a "share and reuse" approach for education and training (ARIADNE, 2003).

On September 22, EM-Assist, Inc., was granted a trademark for the term, rapid learning object™, with no further definition of the term released. The following month Mark Norton, an e-learning consultant who worked on the IMS abstract framework, posted an article about “media objects,” which he defined as a user interface element with some physical appearance and associated interactive behavior. It has a default appearance, can be customized and may be coupled to a content element for display or manipulation (Norton, 1996).

November was a busy month as David Merrill suggested using the term *knowledge object* which consists of a set of predefined elements. Each of these elements is instantiated by way of a multimedia resource (text, audio, video, graphic) or a pointer to another knowledge object. Some of these elements include the name of the knowledge object, a portrayal of the knowledge object, the location of the knowledge object’s portrayal, and other informational elements such as a description or demonstration (Merrill, 1996).

All of these developments did not go unnoticed. Later that month, the Learning Technology Standards Committee (LTSC) of the Institute of Electrical and Electronics Engineers (IEEE) formed to develop and promote instructional technology standards (LTSC, 2000). This was a critical component in achieving Mr. Hodgins’ goal of achieving interoperability.

Oracle’s learning object team’s hard work came to fruition on December 5, 1996. The Oracle Corporation Education division launched the Oracle learning architecture (OLA), often mistakenly called the Oracle learning application. Seventy-five courses (Brown, 1996) were initially made available and by July of 1997 more than 93 courses were available online in more than 140 countries (Locklear, 1997). This was the first phase, an internet service (Ellwood, 1997), of a two-part rollout. The second phase, released in July of 1997, offered an Internet product and authoring environment where individual objects containing text, graphics, video and audio would be assembled by each student into a customized course (Brown, 1996).

The Gateway to Educational MaterialsSM (GEM) consortium formed and began developing a repository infrastructure. Their mission was to expand educators’ capability to access Internet-based lesson plans, instructional units and other educational materials in all forms and formats (Laundry, 2006). This group established a national repository of educational materials. As such it was their goal to improve the organization and accessibility of the substantial collections of materials that were already available on various federal, state, university, nonprofit and commercial Internet sites (Laundry, 2006).

1997

This year produced numerous developments as Mr. Hodgins' original concept had captured national attention. The learning architecture/learning objects task force began operating under an open model welcoming all stakeholders (Conner, 1998).

In May of 1997, the national learning infrastructure initiative of EDUCOM, which later became EDUCAUSE, instituted the instructional management systems project and held its first metadata meeting (EDUCAUSE, 2004). Today this organization operates as the IMS Global Learning Consortium, Inc. This group has made a tremendous impact on education, in both the public and private sectors, across several continents (IMS, 2006). Shortly after EDUCOM's initiation of the IMS project, the United States Department of Defense birthed the advanced distributed learning initiative in an effort to identify better, more cost effective and efficient ways to educate and train Department of Defense service members (ADL, 2006). This initiative is a cooperative effort between the public and private sectors to develop and share common standards, reusable learning tools, and content (Department of Defense, 2000).

The Learning Technology Standards Committee (LTSC) of the Institute of Electrical and Electronics Engineers (IEEE) commenced working on the development and maintenance of the learning object metadata (LOM) standard (Duval, 1998).

Dr. James J. L'Allier, who is currently the chief learning officer at NETg, published a corporate brief in which he defined a learning object as the smallest independent structural experience that contains an objective, a learning activity and an assessment (L'Allier, 1997).

The California State University Center for Distributed Learning established the Multimedia Educational Resource for Learning and Online Teaching (MERLOT) system. This was modeled after the NSF funded project, "Authoring Tools and an Educational Object Economy (EOE)" (MERLOT, 2006).

The Gateway to Educational MaterialsSM (GEM) consortium officially launched its repository.

1998

In March, the Learning Technology Standards Committee published the draft standard for learning object metadata, which defined a learning object as any entity digital or nondigital that may be used for learning, education or training (Duval, 1998).

Both Tom Kelly and Chuck Barritt joined the Internet Learning Solutions Group (ILSG) at Cisco Systems, Inc. Mr. Kelly is the vice-president of this group and Mr. Barritt serves as Program Manager. They continued with the learning object research

that they started while employed by Oracle Corporation. This work culminated in the release of a white paper in 1999 entitled “Reusable Information Object Strategy: Definition, Creation Overview, and Guidelines.” In this document they added and coined two critical components supporting their strategy: a reusable information object (RIO) and a reusable learning object (RLO). A reusable information object is defined as a collection of content, practice and assessment items assembled around a single learning objective (Barritt et al., 1999).

A reusable learning object is created by combining an overview, summary, assessment, and five-to-nine RIOs. An RLO is based on a single objective, derived from a specific job task (Barritt et al., 1999). More specifically a RIO is a granular, reusable chunk of information that is media independent. Individual RIOs are then combined to form a larger structure called a reusable learning object (RLO) (Barritt et al., 1999).

Royal Roads University established the Centre for Economic Development and Applied Research (CEDAR) to develop new business enterprises, including applied research ventures, special training programs and partnerships with local industry (Heins, Mundell, & Muzio, 2001). To accommodate growing student demand for distance learning, the University installed a Microsoft exchange server to enable robust communication between faculty and students to deploy their learning objects. As part of this endeavor, the centre defined an e-learning object as a small piece of text, visual, audio, video, interactive component and so forth that is tagged, and stored in a database. They can also be other types of objects, for example, a FAQ or a glossary definition.

The IEEE Learning Technology Standards Committee stated that learning objects are defined here as “any entity, digital or nondigital, which can be used, reused or referenced during technology supported learning” (IEEE Standards, 1998).

1999

On January 12, President William Jefferson Clinton signed Executive Order 13111, titled “Using Technology to Improve Training Opportunities for Federal Government Employees,” which established the president’s task force on federal training technology. This task force was charged with providing leadership regarding the effective use of technology in training and education; make training opportunities an integral part of continuing employment in the federal government; and facilitate the ongoing coordination of federal activities concerning the use of technology in training (Clinton, 1999). Later that year, prompted by this charge, the first ADL Co-Lab was established in Alexandria, Virginia (ADL, 2006).

In March, Terry Anderson (1999), professor and Canadian research chair in Distance Education at the University of Alberta, submitted the proposal entitled “Campus

Alberta Repository for Educational Objects (CAREO)” to the Province of Alberta for a grant through their Learning Enhancement Envelope and Curriculum Redevelopment Fund. This work was influenced by the MERLOT project and its founders would become active participants. The purpose of CAREO was to establish an online repository of educational objects for postsecondary educators, and establish and support a professional development community that both creates, reviews and utilizes these objects through ongoing professional development activities (Buell, 2000).

In October, Rice University launched a repository project dubbed the “secret web initiative.” This is a not only a learning repository but an authoring and collaboration application. This project would later become known as Connexions, which in 2000 would host 200 modules (Brent, 2006). This same year, Provost Robert A. Brown of Massachusetts Institute of Technology asked a committee comprised of students, faculty and staff to formulate a strategic e-learning plan (MIT, 2006a). The outcome of this project was the creation of the OpenCourseWare project. This is a repository of lessons and content authored by MIT faculty. The intent of the project was to provide free, searchable access to MIT’s course materials for educators, students and self-learners around the world (MIT, 2006b).

Research continued on the theoretical and development fronts. David A. Wiley II, a research assistant and graduate student, and now a postdoctoral fellow in the Instructional Psychology and Technology Department at Utah State University, offered his definition of a learning object as anything digital, whether it has an educational purpose or not (1999). This same year CISCO unveiled their e-learning plans in a strategy paper branding their model as a reusable learning object. This defined a collection of RIOS, overview, summary and assessments that supports a specific learning objective (Barritt et al., 1999). Also, the Wisconsin Online Resource Center or Wisc-Online was created as a repository for the State of Wisconsin’s technical colleges (Wisc-Online, 2000). This organization defined learning objects as Web-based, self-contained chunks of learning (Chitwood, 2000).

2000

January was an active month for the advancement of the e-learning industry and the learning object model. The Advanced Distributed Learning Initiative published the shareable courseware object reference model (SCORM), version 1.0 (ADL, 2006). These specifications defined a learning object as an interoperable, durable, computer-based course or component of a course packaged with sufficient information to be reusable and accessible (Dodds, 2000). At this same time four organizations collaborated on a grant solicitation to the National Science Foundations for a digital repository of learning objects. These four were the American Society for Engineering Education, the Institute of Electrical and Electronics Engineers, Inc., Iowa State

University and Virginia Polytechnic Institute and State University. Their solicitation was submitted to the National Science Technology, Engineering and Mathematics Education Digital Library (NSDL) program of the National Science Foundation (NSF solicitation 00-44) (Rahman, 2003). A final proposal was submitted to NSF entitled "A Digital Library Network for Engineering and Technology." The grant was awarded, NSF GRANT DUE-0085849, and in September the Digital Library Network for Engineering and Technology (DLNET) was launched (Rahman, 2003). The vision for the project was to create a platform complementing and supporting lifelong-learning and continuing education activities of practicing engineers and technologists (Rahman, 2003). Several works were developed in conjunction with this project including a paper defining a DLNET learning object. These works defined these items as structured, stand-alone resources that encapsulate high quality information in a manner that facilitates learning and pedagogy (Mahadevan, 2001). Stephen Downes, a senior research officer with National Research Council, suggested that learning objects are reusable and interoperable units of learning content (Downes, 2000).

In December, Clive Shepherd, an e-learning consultant, offered his interpretation that a learning object is a small, reusable digital component that can be selectively applied alone or in combination by computer software, learning facilitators or learners themselves, to meet individual needs for learning or performance support (Shepherd, 2000). David A. Wiley II authored materials that purposed a variant of the definition in his early work that identified these as any digital resource that can be reused to support learning (Wiley, 2000).

2001

The Advanced Distributed Learning (ADL) Initiative released an update to their shareable courseware object reference model. Under version 1.1, their learning object term became shareable content object and the model was now a shareable content object reference model. This work would again be updated in October with the release of the shareable content object reference model version 1.2.

A case-study was posted by Monson and South, of the Center for Instructional Design at Brigham Young University (BYU), about the principles, infrastructure and development of learning objects at their institution and their attempt of integrating this model into the institution's curriculum. In this work they use the term *media object*. Monson and South define such an object as digital media that is designed and/or used for instructional purposes. Such objects range from maps and charts to video demonstrations and interactive simulations (South & Monson, 2001).

In a paper submitted to the IMS Learning Design Group, Rob Koper, a professor of Educational Technology at the Educational Technology Expertise Centre (OTEC)

of the Open University of The Netherlands, suggests using the term *Units of Study* in place of learning object. He goes on to define *unit of study* as the smallest unit providing learning events for learners, satisfying one or more interrelated learning objectives (Koper, 2001). It is contextually and semantically indivisible. Disassembly would yield the unit ineffective and no longer a component of the educational process, as it would merely be a series of disjointed assets or media elements. This paper also introduced educational modeling language (EML) which maintains a pedagogical focus that defines roles and activities for a unit of study. This paper and other collaborative works were to become the core of the IMS Learning Design standard.

The NETg catalogue eclipses 75,000 learning objects. These are used by leading companies such as Daimler-Chrysler, Honeywell, Proctor & Gamble and Dow Chemical (Business Wire, 2001).

Norm Friesen, an information architect with the CAREO project, contributes some materials supporting the project's definition of an educational object. It is said that a learning object is any digital resource with a demonstrated pedagogical value, which can be used, reused or referenced to support learning (Friesen, 2001).

2002

In November 2002, several more scholarly works were published. Among these was an article titled “(Learning) Objects of Desire: Promise and Practicality,” in which Lori Mortimer, from the Open University of The Netherlands, stated that a learning object is a piece of content that is smaller than a course or lesson (Mortimer, 2002).

In February, the Centre for Learning and Teaching through Technology (LT3) at the University of Waterloo launched a collaboration project between Ontario's universities and colleges. This effort would not only build upon the MERLOT effort but also establish their own repository. This resulted in the creation of the Co-operative Learning Object Exchange (CLOE) (Goldsworthy, 2002).

2003

Polsani (2003), a professor at the University of Arizona, using Charles Sanders Peirce's theory of signs, defines a learning object as a form of organized knowledge content involving learning purpose and reusable value. Monique Doorten and colleagues, in a case study about the Open University of the Netherlands, proposed that learning objects are any reproducible and addressable digital or nondigital resources used to perform learning activities or support activities (Doorten, Giesbers, Janssen,

Daniels, & Koper, 2003).

2004

In January of 2004, the first edition of the shareable content object reference model version 2004 was released (ADL, 2006). In July the second edition is published. In October, a paper by Michael Engelhardt, a professor at the University of Applied Sciences, and colleagues stated that e-learning objects denote the smallest, atomic learning units covering a single, self-consistent subject (Engelhardt, Hildebrand, Lang, Schmidt, & Werlitz, 2004). Wesleyan University embarks on a mission to create their own repository. This endeavor is open for interinstitutional collaboration. The initiative becomes known as the LoLa Exchange: learning objects, learning activities (LoLa) as an exchange for facilitating the sharing of high-quality learning objects (LoLa, 2006).

Conclusion

In a relatively short time, a fair amount of work by both public and private sectors has contributed to the advancement of Mr. Hodgins' learning object concept. This is evident in the table that follows. This timeline marks each of the key events mentioned earlier in chronological order where possible.

Table 1. Condensed timeline of events

Year	List of Events
1992	Wayne Hodgins coins learning object
1994	LOLA task force established Oracle Research and Development begins NETg NLO published
1996	ARIADNE starts Rapid learning object™ trademarked Norton writes about “Media Objects” Merrill suggests using “Knowledge Objects” The IEEE Learning Technology Standards Committee forms Oracle Learning Architecture (OLA) released Gateway to Educational Materials SM (GEM) organized
1997	IMS Global Learning Consortium, Inc. formed Advanced Distributed Learning (ADL) Initiative commissioned Dr. James J. L’Allier publishes work on NLOs MERLOT launches GEM repository opens
1998	Draft Standard for Learning Object Metadata is published CEDAR established
1999	Executive Order 13111 signed CAREO conceived and funded David A. Wiley II publishes his contributions Barritt and Lewis publish Cisco Systems, Inc. RLO strategy paper Rice creates Connexions MIT launches the OpenCourseWare project Wisc-Online established
2000	SCORM version 1.0 released DLNET launches Shepherd and Wiley publish additional findings Downes posts his thoughts
2001	SCORM version 1.1 and 1.2 released Monson and South published material on integrating learning objects into the curriculum “Units of Study” and Educational Modeling Language (EML) are suggested by Koper Norm Friesen suggests the term “Educational Object”
2002	Mortimer offers another definition CLOE commences
2003	Additional research is contributed by Polsani and Doorten
2004	SCORM version 2004 published Engelhardt suggests the term “E-learning Object” Wesleyan University launches LoLa

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