A Field Guide to Learning Objects

By ASTD & SmartForce

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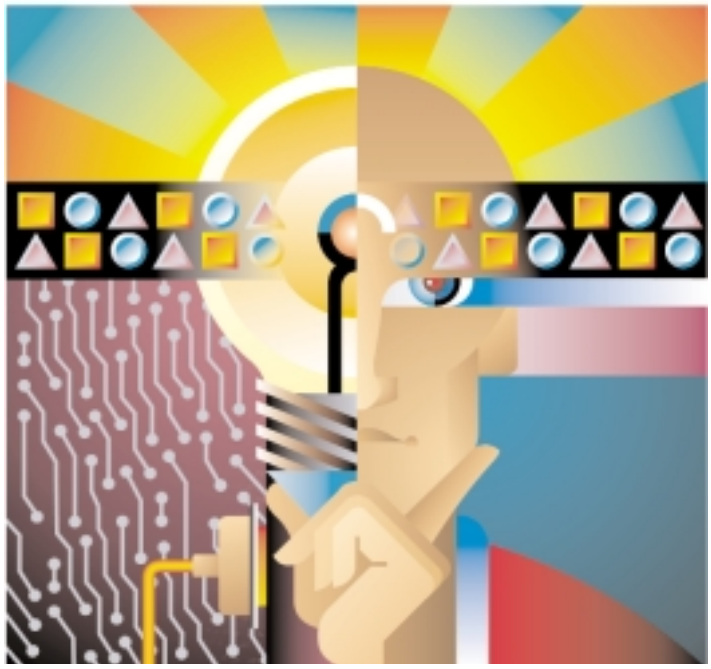

Learning object. Modular building block. Chunk.

Reusable information object. Shareable content object. Nugget. Lego. Whatever. The list goes on, but each term is simply a synonym for what we're calling a learning object.

Instructional designer Lori Mortimer explains the hype around learning objects: "For years, the e-learning industry has anticipated the day when learners could personalize, assemble on the fly, and access e-learning on demand. Development teams would be able to build content a single time, store it electronically, reuse it, and deploy it in different formats with a simple button click. A small content piece--a learning object--would establish the foundation upon which these capabilities rest."

The organization benefits by using learning objects because it's able to

- develop and deploy learning content quickly and efficiently
- port content easily between multiple learning management systems and learning content management systems
- reduce content development and delivery costs
- reduce maintenance time and costs.

Likewise, the learner benefits because he or she can access individualized learning paths and competency-based rather than course-based learning events.

But what are learning objects, exactly? More important, how and when should they be used? This document outlines the types of learning objects that are now developed by most e-learning suppliers.

ASTD's *Field Guide to Learning Objects* is part of a *Learning Circuits* series; each guide is a concisely written, practical guidebook that provides in-depth coverage of a single topic vital to e-learning.

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Ideal Attributes of Learning Objects

Warren Longmire's *Learning Circuits* article, "A Primer on Learning Objects," outlines two requisite components of a learning object: the object content and its metadata tag, which provides descriptions, keywords, and so forth. As software developers race to produce authoring and tagging tools, additional context-enriching options may become available. The most desirable tools will permit scalable contextualization so that learners can control the extent to which context is presented with content.

In an environment in which context is scalable and adaptive, the ideal learning object is

- modular, free-standing, and transportable among applications and environments
- nonsequential
- able to satisfy a single learning objective
- accessible to broad audiences (such that it can be adapted to audiences beyond the original target audience)
- coherent and unitary within a predetermined schema so that a limited number of metatags can capture the main idea or essence of the content
- not embedded within formatting so that it can be repurposed within a different visual schema without losing the essential value or meaning of the text, data, or images.

Object issues

According to Warren Longmire, the object approach can satisfy both immediate learning needs—such as a knowledge-based or skills-based course—and current and future learning needs that are not course-based. There are several arguments for designing and developing material to be reused as learning objects, including the following criteria:

Flexibility. If material is designed to be used in multiple contexts, it can be reused more easily than material that has to be rewritten for each new context. It's harder to uncouple an object from the context of its parent course and then recontextualize it than it is to contextualize as part of design and development.

Ease of updates, searches, and content management. Metadata tags facilitate rapid updating, searching, and management of content by filtering and selecting only the relevant content for a given purpose.

Customization. When individual or organizational needs require customization of content, the learning object approach facilitates a just-in-time method to customization. Modular learning objects maximize the potential of software that personalizes content by permitting the delivery and recombination of material at the level of granularity desired.

Interoperability. The object-based model allows organizations to set specifications regarding the design, development, and presentation of learning objects based on organizational needs, while retaining interoperability with other learning systems and contexts.

Facilitation of competency-based learning. Competency-based approaches to learning focus on the intersection of skills, knowledge, and attitudes within the rubric of core competency models rather than the course model. While this model has gained a great deal of interest among employers and educators, a perennial challenge in implementing competency-based learning is the lack of appropriate content that is sufficiently modular to be truly adaptive. The tagging of granular learning objects allows for an adaptive competency-based approach by matching object metadata with individual competency gaps.

Increased value of content. From a business standpoint, the value of content is increased every time it is reused. This is reflected not only in reduced costs for design and development, but also in the possibility of selling content objects or providing them to partners in more than one context.

Metadata

There are two requisite components of a learning object: the object content and its metadata tag. Former Centra CEO Harvi Singh explains:

At its most basic level, metadata provides a common set of tags that can be applied to any learning resource, regardless of who created it, what tools they used, or where it's stored. Tags are, in essence, data describing data.

The metadata allows online learning resources to be tagged with searchable properties or attributes (such as author, keyowrds, publisher name, language, and learning objectives). Use of standardized metadata allows organizations to tag, store, and retrieve online content resources in their own repositories and those of their external, third-party content suppliers over the Internet.

Regardless of the time or expense put into creating advanced training simulations, movies, and games, the content is useless unless it can be searched and indexed easily. This is especially true as the volume and types of learning content increase.

What the Dewey Decimal Classification system is to books, metadata tagging is to learning objects.

Defining learning objects

It may surprise you that no single learning object definition exists within the e-learning industry. Learning objects are different things to different e-learning professionals. In fact, there seem to be as many definitions as there are people to ask.

Lori Mortimer offers a simple definition: “At its most basic level, a learning object is a piece of content that's smaller than a course.” Sounds simple, right? Unfortunately, learning objects are more complex.

Here’s the long explanation: A learning object is a self-contained block of learning that fulfills a single, stated learning objective. In general, learning objects can be launched and assessed independently. Based on open systems standards, they can be used within multiple learning management systems. To add to the compexity, learning objects employ a broad array of media ranging from simple text-based formats to sophisticated multimedia experiences. Indeed, learning objects can be delivered through any medium. For instance, they can take the form of an online lesson, a classroom-based seminar, or a role-play simulation.

Learning objects arranged together to achieve a specific instructional purpose create a learning path. A path can be viewed as a comprehensive program that provides an in-depth understanding of a subject, or as a collection of e-learning objects that can be mixed and matched to meet specific learning needs. For example, an administrator can customize learning paths by inserting new objects, deleting unnecessary objects, and rearranging the sequence in which objects should be taken. Furthermore, a learner can customize learning paths by following learning objects in the order that best suits their learning style, taking pretests to identify what they already know, and diverging from core content in a variety of structured ways.

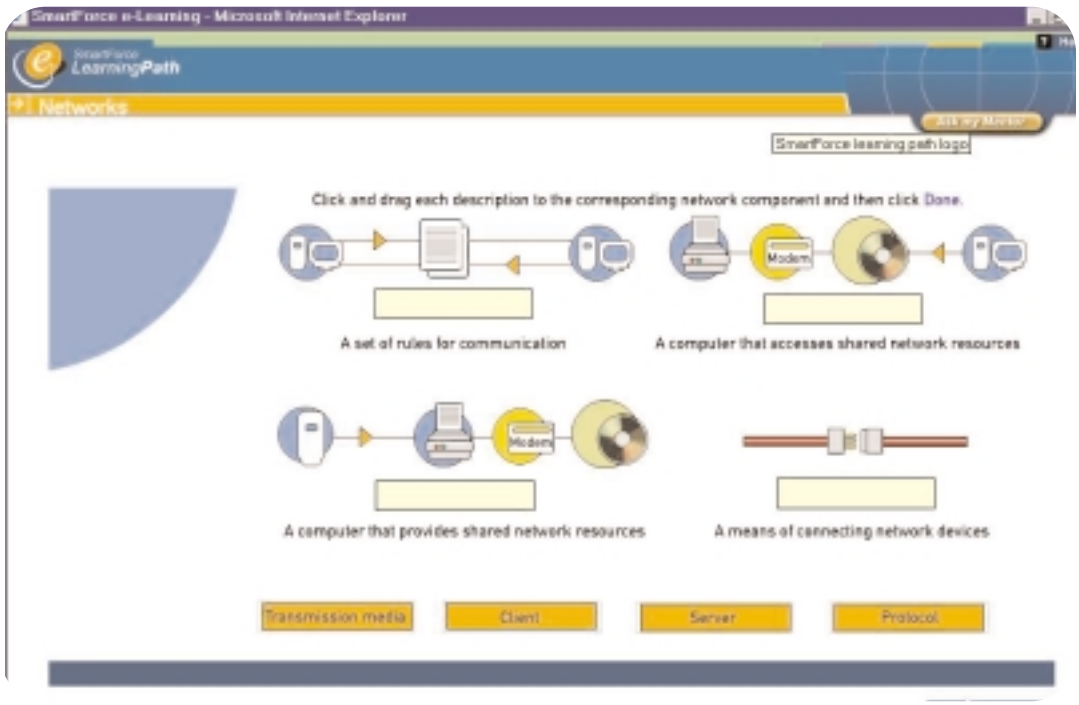
For instructional design purposes, learning paths are always subdivided into e-learning objects. In general, a good rule is to construct objects around four distinct learning modes: instruction, collaboration, practice, and assessment.

Instruction objects:

During the instruction mode, the learner is presented with clear explanations of the theory behind the subject being covered. These ideas, concepts, and processes are demonstrated using a combination of real-world examples and screenshots of software interfaces or other appropriate graphics. To encourage interactivity and involve the learner in the learning process, the instruction mode also includes anticipatory questions and exercises.

Instruction object 1: Lessons

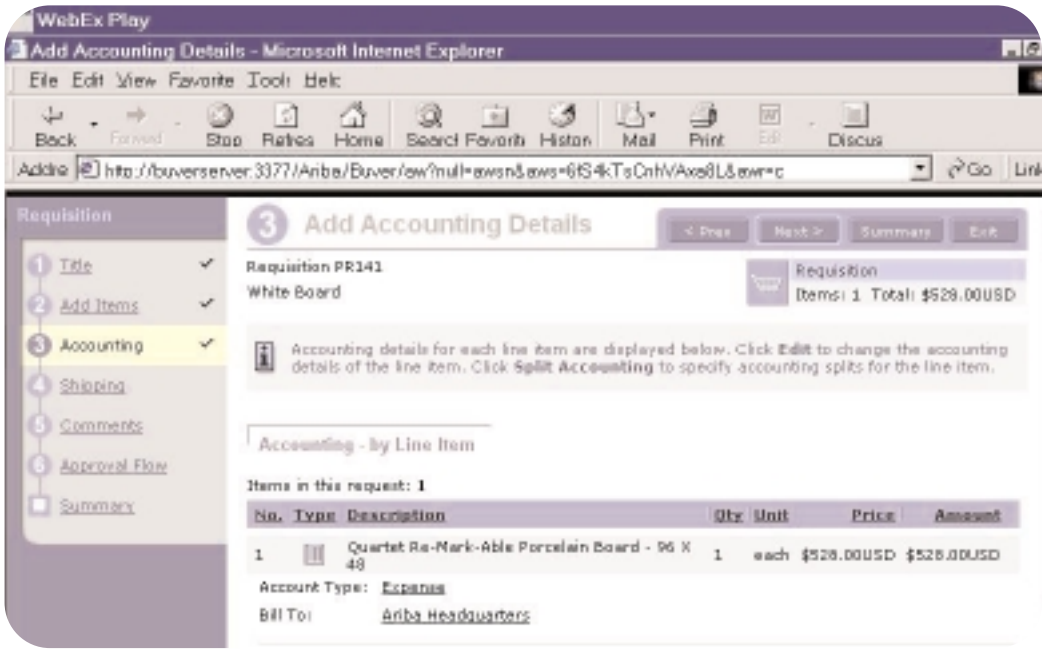
A lesson combines text, graphics, animation, audio, questions, and exercises to create a rich, highly interactive learning experience for the user. Via lessons, learners can access online mentoring and follow links to supplementary resources, such as Websites, articles, events, activities, downloads, recommended reading lists, research projects, learner guides, and glossaries. Lessons are used in a variety of learning situations ranging from the explanation of concepts and theories to the demonstration of software interfaces. The extent to which rich graphics, animation, and audio is used will depend on the material under discussion. For example, animation and audio are typically used for introductory, end-user oriented learning content while the more technical GUI-based lessons will generally employ mainly text and graphics.



Instruction object 2: Workshops

Workshops are learning events in which an expert practitioner provides learners with hands-on training. They can include demonstrations of live software applications, presentation slides, whiteboard activities, Web tours, and video broadcasts. Workshops are available in both live and archived formats and are delivered using such collaboration tools as WebEx and Centra.

Live workshops act as collaborative events that allow learners to interact with the presenter and peers online or via a conference call. In addition to chat and email, live workshops should contain interactive features, for example, learner polls. Archived workshops provide permanently accessible practical training. Transcripts, slides, FAQs, and data from polls and questionnaires are made available to learners.



Instruction object 3: Seminars

Seminars are events in which experts speak directly to learners using a combination of video, audio, interactive slides, and text messaging capabilities. Seminars can begin with a video of a chosen expert discussing a specific topic alone or with an interviewer. Videos are followed by a question-and-answer session, which includes live and presubmitted questions from the learners.

Seminars can be delivered as live events or in an archived format. Live seminars allow learners to submit questions and participate in polling activities. For obvious reasons, it's best to use archived seminars to introduce introductory, generalized topics in a personal way.

Instruction object 4: Articles

Articles are brief, text-based objects that either address specified learning objectives within the learning path or act as supplemental study material. Although articles are best suited to learning situations in which the majority of the instructional content is conveyed through text, these objects can contain charts and diagrams explaining the overall message. Articles are used mainly in situations where it's preferable to provide the learner with the entire content of an e-learning object on a single page.

Instruction object 5: White papers

White papers are detailed text-based objects that address complex topics, for example, current developments in a technological or general business area. White papers are most effective for learning situations in which the majority of the instructional content is conveyed through text. However, because whitepapers are lengthy, designers should try to break information into smaller digestable chunks. White papers are often found in high-end technology or business learning paths, but they're also effective when used as supplemental study material.

Instruction object 6: Case studies

Case studies are text-based objects that provide in-depth analyses of an industry, business, or software product implementation. Using real and fictional examples, these objects help illustrate the negative and positive experiences of other organizations. For example, a case study might explore a CEO's role as a company deals with the ethical and financial repercussions of discovering a product defect. Case studies are best suited to learning situations in which the majority of the instructional content is conveyed through text. Transcripts from chats and interviews can also be included.

Collaboration objects: During the collaboration mode, learners discuss new ideas or what they've learned in the instruction mode with other people. Learners can use a variety of methods to collaborate: live seminars, workshops and meetings, mentor interaction and exercises, and such community building tools as chats, threaded discussions, and email.

Collaboration facilitates the learning process by offering real-time human interaction, a personalized learning experience, and situation-specific advice. For example, if the learner has a query on something covered in a lesson, they could access a team of expert mentors, available 24x7x365, to find out more.

Please note that some learning objects can belong to multiple learning nodes. For example, seminars and workshops are used for both instruction and collaborative learning.

Collaboration object 1: Mentored exercise

Mentored exercises are open-ended exchanges that offer feedback from a qualified expert mentor. When carrying out a mentored exercise, learners are required to complete an assignment (for example, research a project or answer a question) that demonstrates their mastery of a skill or complex area of knowledge. Learners submit their assignment to a mentor who evaluates it and provides direct feedback, making this type of exercise ideal for situations in which learners can potentially devise different answers to the same question.

Collaboration object 2: Chats

Chats allow learners to share their experiences and knowledge on an intimate level. More important, chat transcripts can be archived, referred to later, and used as resources for case studies, white papers, and so forth. Sample chat formats include expert-led chat, peer-to-peer chat, and moderated chat.

Collaboration object 3: Discussion boards

Discussion boards enable learners to talk to anyone in the world about ideas that interest them. Threads are organized by interest and remain online so learners can review previous discussions or add their contributions at a later date. This idea of informational exchange is central to the e-learning experience and learners should be encouraged to share ideas and suggestions in this informal format.

Collaboration object 4: Online meetings

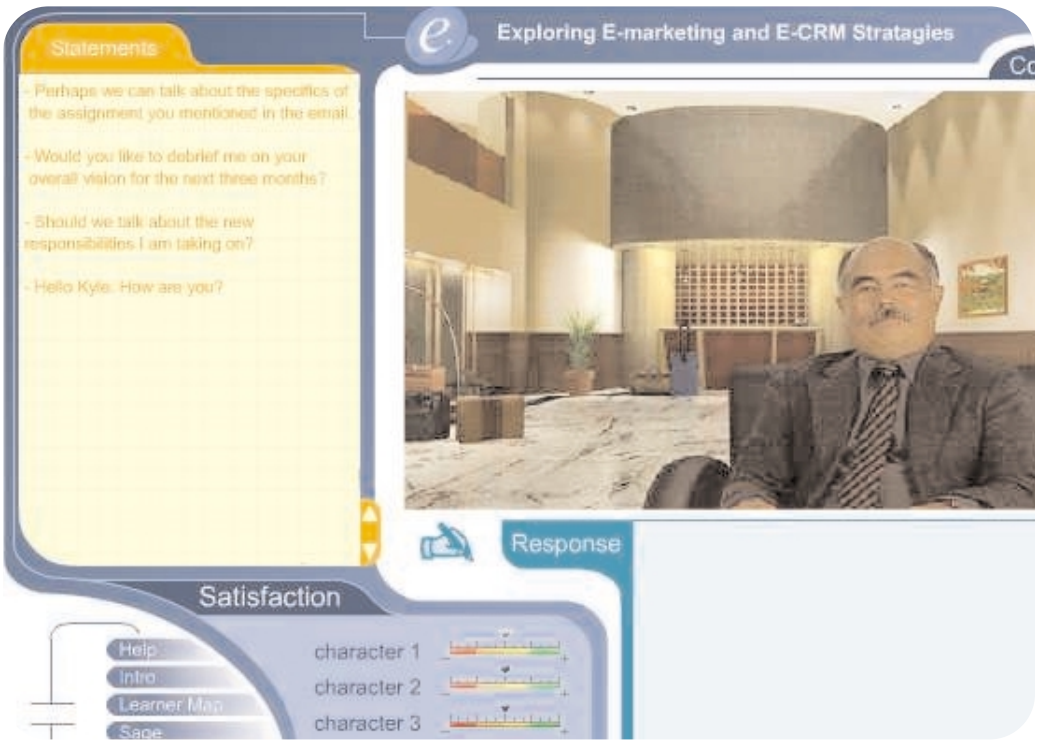
Learners that host and attend private online meetings can share whiteboards, documents, presentations, Webpages, and even desktop applications with geographically dispersed colleagues. Online meetings are most effective when learners need to gather information on a technical topic or work through instruction lessons, but it's important to limit the time and number of users.

Practice objects: During the practice mode, the learner is given the opportunity to apply newly acquired skills and knowledge in an environment that closely simulates the real world experience.

Practice object 1: Role-play simulations

Role-play simulations enable students to build and test their knowledge and skills by interacting with a realistic simulation of a business scenario. In these game-like simulations, learners interact with virtual characters and consult a wide variety of resources in order to achieve a series of goals.

For example, salespeople can learn better methods for approaching clients, the most effective sales pitches, and proven ways of dealing with potentially awkward situations. To assist the learner in his or her task, the simulation often contains support materias, including white papers, PowerPoint presentations, links to Websites, email advice, explanations of concepts, and best practice guidelines. In some cases, background information is also available in the form of an online knowledge repository.



Simulation Organizations

These organizations are examining the role of simulations in education:

- ACM Special Interest Group on Simulation; htttp://www.acm.org/sigsim
- Association of Business Simulation and Experiential Learning; htttp://www.towson.edu/~absel
- Games-to-Teach Project, a partnership between Microsoft and MIT; htttp://cms.mit.edu/games/education
- International Simulation and Gaming Association; htttp://isaga.pm.it-chiba.ac.jp
- North American Simulation and Gaming Association/Electronic Simulation and Gaming Association; htttp://www.nasaga.org
- Simulation & Gaming: An Interdisciplinary Journal of Theory, Practice, and Research; htttp://www.unice.fr/sg
- Society for Computer Simulation; htttp://www.scs.org
- The Society for the Advancement of Games and Simulations in Education and Training; htttp://graph.ms.ic.ac.uk/sagset
- USC Institute for Creative Technologies htttp://www.ict.usc.edu

Practice object 2: Software simulation

Software simulations replicate GUI environments and are designed to allow learners to practice complex tasks associated with specific software products. These simulations allow learners to complete the tasks in all of the ways supported by the live software and will demonstrate the correct steps to learners if they're unable to perform the required tasks. These simulations are used to mimic typical software tasks.

Practice object 3: Hardware simulation

Some e-learning paths (for example, those relating to Intel and A+ certification) deal with computer hardware as well as software components. Hardware simulations allow learners to complete authentic technical tasks, such as install and configure hardware components or use test instruments in a simulated environment. These simulations are highly realistic and give the learner a good idea of what to expect on the job.

Practice object 4: Coding simulation

Coding simulations replicate coding environments and are designed to allow learners to practice complex coding tasks associated with specific software products. Using these simulations, learners complete coding tasks in all of the ways supported by the live software. Coding simulations will demonstrate the correct code to the learner if they're unable to perform the required tasks.

Practice object 5: Conceptual simulation

Conceptual simulations (also known as interactive exercises) help learners practice the application of ideas and understand how certain kinds of information are related. Learners are presented with a variety of resources—company profiles, product descriptions, process diagrams, and so forth—and are asked to answer a series of questions or carry out matching and sequencing exercises. These simulations are used in situations in which learners need to practice making decisions based on complex information.

Practice object 6: Business-modeling simulations

Business-modeling simulations (also known as quantitative simulations) are complex, number-crunching exercises designed to expose learners to technical business skills. They allow learners to control and manipulate a range of variables in a virtual company in order to learn how to manage real-life situations and to understand the implications of their decisions on a broader scale. This type of simulation is used for business skills learning paths that focus on financial matters.

Practice object 7: Online lab

Used specifically for IT-related topics, online labs are skills-based laboratory exercises that enable learners to remotely configure live network devices in real time over the Internet. These objects provide hands-on access to live networking equipment and applications anytime, anywhere, allowing IT professionals to go beyond simulated exercises and instructional content to solve real-world networking problems encountered in the field without risking mission-critical systems and equipment. In addition, by practicing on real equipment and applications, learners can improve their level of preparation for certification exams.

Practice object 8: Research project

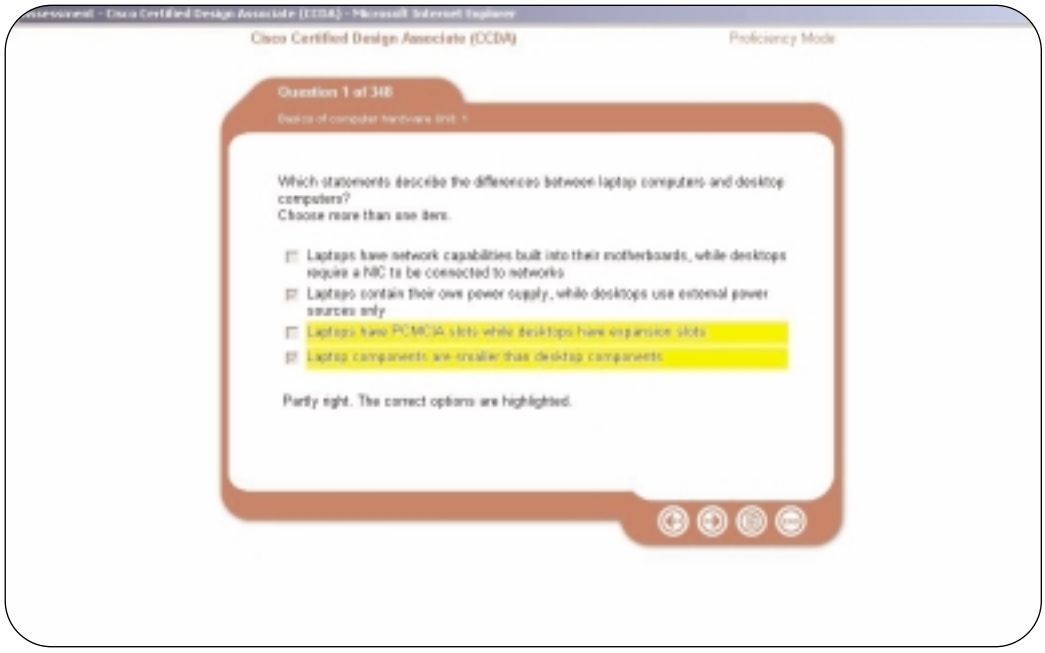
Research projects are open-ended, complex activities that encourage learners to undertake a detailed exercise on a specific subject area, requiring learners to conduct research and analyze their findings. For example, a business skills project might ask a learner to compare the Web-based activities of two companies by visiting their sites. Another example may ask a learner to write a report or a speech based on information that's hosted on a specified Website. An example of an IT research project might require learners to visit a particular Webpage and examine its source code to find a particular HTML tag or JavaScript routine.

Assessment objects:

During the assessment mode, learners take tests to evaluate the depth of their knowledge before they start learning or to demonstrate their mastery of the material after taking a complete course.

Assessment object 1: Pre-assessment

Pre-assessment tests evaluate the depth of the learners' knowledge before they actually begin the learning process. The results of these tests help learners and their managers determine the scope of their learning needs. For example, organizations may pre-assess to place learners in the correct programs or to place a job applicant in the right job. Learners taking pre-tests can also save significant study time as the test results may allow them to skip material that they already know and concentrate on areas that are weak.



The Role of Standards

Standards provide a consistent framework for describing learning objects, without specifying what type of content or how much of it goes into a learning object.

For example, the current SCORM standard "tells you how learning content can be labeled so that it can be reused, but doesn't define what the structure is or what a learning object looks like," says Bryan Chapman, e-learning analyst at brandon-hall.com. "It's like the label on a can of food," he adds. The label doesn't dictate what to put in the can; it describes what's in the can.

To learn more about standards, contact the following standards organizations:

❍ ADL (Advanced Distributed Learning); www.adlnet.com. ADL holds regular PlugFests which validate and document the interoperability of e-learning tools based on SCORM (Sharable Content Object Reference Model) specifications. SCORM consists of DoD specifications that focus on the ability to deliver and track content from multiple sources

❍ IMS Global Learning Consortium; www.imsproject.org. IMS is a non-profit organization that includes more than 200 educational institutions, commercial entities, and government agencies. Its purpose is to develop and promote standards that define an open architecture for networking learning systems.

Assessment object 2: Proficiency assessment

Proficiency assessments demonstrate whether the learner has successfully assimilated the e-learning content and mastered the intended skills. For example, if the learner attains a specific score for a learning path (perhaps, 70 percent), he or she would be considered to have achieved all of the objectives of that learning path and would be ready to fulfill a particular role or task. Proficiency exams, which are available at the learning path and the learning object level, also provide insight into the learner's future instructional needs.

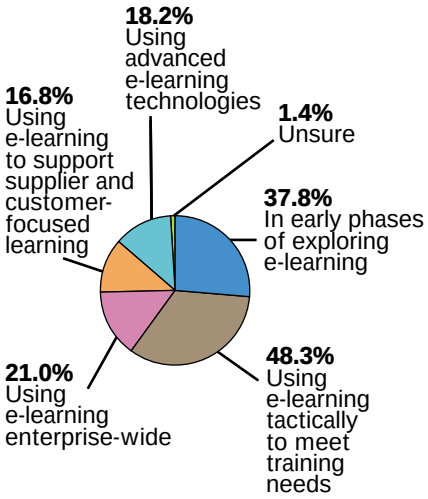
Assessment object 3: Performance test

Performance tests are scored assessments that evaluate the learner's ability to successfully complete a specific task, usually in a GUI-based application. Unlike practice simulations, assessment simulations are scored. An overall score is allocated to the test and each individual step is weighted according to its level of difficulty. By doing so, learners that don't complete all of the steps or falter on a minor one can still be rewarded for each step they perform correctly. Once the learners have completed the task, they receive feedback on their overall performance.

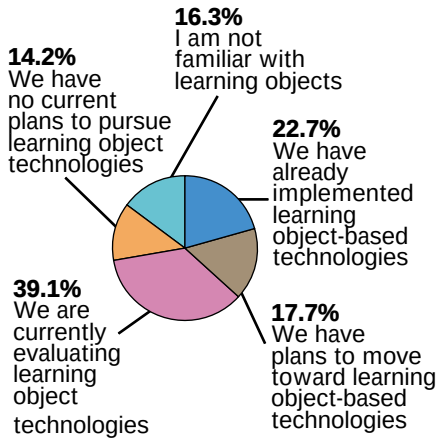
Assessment object 4: Certification prep test

Generally taken near the end of a program of certification-oriented study (for example, after a series of e-learning paths), these tests enable the learner to test his or her knowledge in a simulated certification testing environment. Tests can be taken in two modes: study and certification. The study mode is designed to maximize learning by providing feedback, while a timed certification mode is designed to mimic actual certification exams.

How are you using e-learning?



Are you using learning objects?



The Future

The findings from a survey conducted by the Learning on Demand program of SRI Consulting Business Intelligence, which researches e-learning trends, in conjunction with *Learning Circuits,* found substantial interest in learning object methodologies.

The survey sought to measure the degree of interest in the capabilities often associated with learning object-based methodologies. Because the term learning object doesn't have a standard definition, the survey asked participants to indicate their interest in capabilities typically offered by learning object-based systems. These included the ability to update learning content more quickly, to draw from a pool of learning objects to tailor learning content for multiple audiences, to simplify content authoring using template-based tools, and to personalize learning content to the needs of individuals. In each case, a majority of respondents considered these capabilities to be "highly beneficial."

This positive assessment of the capabilities promised by object-based approaches is reflected in the fact that 23 percent of respondents say their organization has already implemented learning object technologies. Another 18 percent say they have plans in place to adopt learning object-based technologies, and nearly 30 percent say they're in the process of evaluating these technologies.

Unfortunately, barriers to full-blown adoption of learning objects do exist. Not surprisingly, budgetary considerations emerged as the most significant obstacle to wider adoption. Immaturity of learning object technologies was also cited by more than 40 percent as a major barrier. Surprisingly, lack of management support was considered only a minor barrier or no barrier at all by a majority of respondents, with only 28 percent citing it as a major barrier.

Bottom line: Organizations that take a broad view of their knowledge assets are moving toward object-based learning content as part of a larger organizational shift. This is where e-learning and knowledge management intersect, where content that isn't necessarily designed for learning can become an important learning component in combination with learning objects. This more expansive approach for providing learning that meets an individual's needs is the focus of many technology developers, and will likely define the next chapter in the evolution of learning objects.