

A Reusable Learning–Object Approach to Designing Online Courses

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INTRODUCTION AND BACKGROUND: LEARNING OBJECTS

While the concept of utilizing learning objects has been addressed in instructional design for some time, slightly different definitions of the term “learning object” are found in the literature. For example, the Institute of Electrical and Electronics Engineers (IEEE) (2005) defines a learning object as “any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning.” Wiley (2000) similarly defines a learning object as “any digital resource that can be reused to support learning” (p. 7). Barritt and Alderman (2004) state a working definition of learning objects as “an independent collection of content and media elements, a learning approach (interactivity, learning architecture, context), and metadata (used for storage and searching)” (pp. 7-8). Merrill (1996) uses a different term, a “knowledge object” that consists of a set of predefined elements, each of which is “instantiated by way of a multimedia resource (text, audio, video, graphic) or a pointer to another knowledge object” (p. 32). Rosenberg (2000) provides a more comprehensive definition of learning or knowledge objects than others:

A learning/knowledge object is the smallest ‘chunk’ of instruction or information that can stand alone and still have meaning to a learner. Instead of defining online training as courses, we could break down the course into its component parts - text objects that focus on a specific concept or skill, media (e.g., video, audio) related to a specific fact or topic, graphics and animations, assessment, and so forth. By creating object libraries, different products can use the same materials, thus reducing redundancy and lowering costs. (pp. 170-171)

A common focus among the definitions of learning objects is on maximizing the efficiency of designing instruction through its granularity and reusability while accomplishing its instructional objective.

REUSABLE LEARNING OBJECTS

A benefit of using learning objects in instruction is that once developed, they can be *reused* in other contexts. Due to the potential cost-effectiveness of recycling existing learning objects, many e-learning vendors and corporate industries are looking into adopting a reusable learning object (RLO) strategy that can facilitate rapid development of e-learning products in various forms such as “problem-based learning, exploratory environments, performance support systems, job aids, help systems, or any blended learning solution” (Cisco, 2003a, p. 6).

An important task in adopting an RLO strategy is to determine the granularity and hierarchy of content. Autodesk, Inc, an early adopter of an RLO strategy, explains that a learning object (LO) is an aggregation of multiple reusable information objects (RIOs), and that an information object contains multiple raw content items. The RIOs used in the Autodesk content model include concept, fact, principle, process, and procedure, known as the CFP3 model (Barritt & Alderman, 2004). An RLO is “a collection [of] RIOs that are grouped together to teach a common job task on a single (enabling) learning objective” (Hodgins, 2002, p. 78).

Cisco Systems, Inc. is another early adopter of an RLO strategy. Built upon Autodesk’s content model, Cisco’s RLO strategy also utilizes the terms RLOs and RIOs to describe its modular e-learning content in hierarchical format, and has developed its own e-learning framework and guidelines. Cisco (2000) defines RLOs and RIOs as follows:

The RLO Strategy is built upon the Reusable Information Object (RIO). An RIO is [a] granular, reusable chunk of information that is media independent. An RIO can be developed once, and delivered in multiple delivery mediums. Each RIO can stand alone as a collection of content items, practice items and assessment items that are combined based on a single learning objective. Individual RIOs are then combined to form a larger structure called a Reusable Learning Object (RLO). (p. 2)

According to Cisco's RLO strategy, a formula for designing a lesson is: A lesson (RLO) = an overview + several topics (RIOs) such as concepts, facts, processes, principles and/or procedures (a.k.a., CFP3) + a summary + a practice + an assessment.

MAIN FOCUS: REUSABLE LEARNING OBJECTS IN ONLINE EDUCATION

Architectures of Online Instruction

The RLO concept is applicable to designing educational online courses as well. The utilization of RLOs in online education is a multifaceted issue that demands thoughtful consideration before implementation. One of the first steps is to determine the purpose of a course and the philosophical framework in order to match the way RLOs are used. A useful tool during this step is Ruth Clark's four instructional architectures: (1) receptive, (2) directive, (3) guided discovery, and (4) exploratory (Clark, 2003). The receptive instructional architecture is usually presented in the form of page turners with no interactivity; therefore, learners take a passive role and "have minimal control over the pacing or sequencing" of the instruction (Clark, 2003, p. 7). The directive type of e-learning allows learners to take a more active role

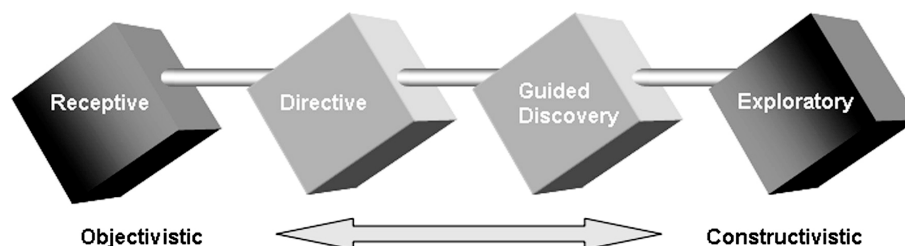
through interactive practice strategies, although the flow of learning may still be controlled by the instruction. The guided-discovery instructional architecture focuses on developing problem-solving skills; instruction presents realistic problems that learners may face in their life. The exploratory instructional architecture provides "the greatest amount of learner control" to facilitate "open-ended learning" (Clark, 2003, p. 10). Learners can select the most relevant resources to accomplish their own learning goals. The exploratory instructional architecture provides the most constructivistic environment of all, whereas the receptive type is characterized as the most objectivistic one (see Figure 1).

Objectivistic Instructional Architectures with RLOs

Reusable LOs are "discrete chunks" of data, information, activities, and so forth, that are broken down into their simplest form (Koppi, Bogle, & Bogle, 2005). The more granular an LO is, the more flexible, context-free, and reusable it is. This assumption is based on objectivism. Barritt and Alderman (2004) have succinctly described the characteristics of a reusable LO as having the following: (1) a single learning objective; (2) no contextual limitations; (3) interactivity; (4) enough description to be discoverable by course designers; (5) the ability to stand on its own; (6) the functionality to be used in any learning situation; and (7) no formatting attached to it. Those attributes make LOs ready-to-use elements that can be integrated into the larger framework of online instruction with ideally no modification necessary other than formatting.

Though reusable LOs should be designed with no or little context of their own, a little bit of context is necessary to form a meaningful lesson. Context can be added in the form of a "wrapper": the beginning and end of an LO that makes it relevant to the current

Figure 1. Clark's four architectures of instruction with different theoretical assumptions



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