

Creating Reusable Learning Objects with Power Point 2003: A Visual Learning Journey

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Abstract

The lecture/ presentation will show a practical method of using Power Point 2003 to build reusable learning objects (RLO) for use in the classroom and on the WEB. Examples from a variety of academic fields and creative design schemes, including new features from Power Point 2003, will be explored.

Reusable learning objects (RLO) from a variety of academic areas will be presented, techniques for creating them will be discussed and visual graphic design elements and techniques will be explored using Power Point 2003.

The components for creating an RLO such as concept presentation, learner activity, learner application, and resources for expanded learning will be demonstrated. The development of an RLO concentrates on the Reusable Info Object (RIO) that is defined as a specific concept developed once, reused multiple times and translated into a variety of media applications.

Introduction

Educators, especially in higher education, have been busy creating Reusable Learning Objects (RLO) for several years. RLOs have been created that teach concepts within the Arts, Business, Education, Humanities, Mathematics, Science and Technology, Social Sciences and a multitude of other fields.

Learning objects are reusable, computer-based (digital), instructional components or modules (objects) used to support learning.

“Learning Objects include, but are not limited to, simulations, electronic calculators, animations, tutorials, text entries, web sites, bibliographies, audio and video clips, quizzes, photographs, illustrations, diagrams, graphs, maps, charts, and assessments. They vary in size, scope, and level of granularity ranging from a small chunk of instruction to a series of resources combined to provide a more complex learning experience.” [Learning Objects: NLII Focus Session, October 10, 2003]

Learning Objects do not just deliver content or information. They provide deliberate instruction to a particular audience of learners of a particular skill level. “The fundamental idea behind Reusable Learning Objects is that designers can build small instructional components that can be reused a number of times in different learning contexts.” [Wiley] Using conventional terminology an RLO would probably be considered smaller than a course, module, or lesson. [Daniel]

Traditionally, teachers have created instructional content and materials with a specific audience and educational goal in mind. When an instructor creates a Reusable Learning Object he or she instead creates an instructional module (learning object) that can be combined with other instructional modules in a variety of ways to fulfill learning objectives for several different courses. [Roberts] “Learning objects have a number of key advantages over standard instructional materials. First, creating small, targeted, modules allows flexibility in constructing courses from a number of smaller objects. Secondly, because each object is smaller, it can be used in a number of different circumstances, and therefore by a greater number of users. Because of this increased audience, designers should be able to invest greater resources in maximizing the effectiveness of each learning object.” [NLII]

Patricia Gray and the Orpheus Alliance, part of the Associated Colleges of the South, have created some wonderful examples of RLOs on their web site, <http://www.colleges.org/~music/modules/LOindex.html>. They began by building a set of learning objects that would be useful in 20th century music classes. Learning objects were developed for the following pieces; Arnold Schoenberg’s Three Piano Pieces, Op. 11 and Pierrot Lunaire, and George Crumb’s Voice of the Whale, Contemporary Cello Techniques. These objects included notes on

performance practice, streaming audio, animated scores, links to bibliographies, and exercises for students.

Prof. Timothy Cutler, Austin College, also part of the Associated Colleges of the South, developed RLOs for his music theory courses. He created these RLOs to provide additional examples of important music theory concepts found in standard literature. Timothy began by creating RLOs that provided examples of Neapolitan Sixth Chords (23 examples) and Modal Mixtures (44 examples). PDF (Adobe Portable Document Files) were created of the examples (WITHOUT titles) so they could easily be reproduced for use in tests, streaming audio examples were created for listening purposes, and Flash movies were created that allowed the viewer to scroll through the score while listening to the audio. The listener can pause the Flash examples and rewind them at any point during playback.

One of the main databases used to locate RLOs is MERLOT. MERLOT stands for Multimedia Educational Resource for Learning and Online Teaching. Check out the MERLOT website (<http://www.merlot.org/>), to locate more RLOs related to your discipline.

Development

Authors can use almost any development tool that creates digital media, including PowerPoint, Photoshop, Dreamweaver, FrontPage, Flash, Macromedia Director, or subject area-specific software to create reusable learning objects. Music faculty might use MIDI compatible software in conjunction with the software previously mentioned. Text, images, video, audio, and animation are used to create the content and interactions that combine to create the individual learning objects. Learning objects should normally include **content, practice, and assessment sections**. Tests should also be conducted throughout the design process and after completion to ensure that the RLO meets the initial needs assessment.

Design

Basic elements (point, line, plane, volume, texture, pattern, color, light) and principles (proportion, rhythm, scale, harmony, balance, emphasis) of design should be used in organizing and visually laying out RLOs. Proportion or hierarchy of letters with or without bullets or graphics should be used to emphasize points of information. Letter fonts should be sans serif for ease of reading. Equal borders and margins should be maintained to assist in organizing the information. A balance between letters, graphics, photographs, etc. and backgrounds needs to enhance the overall design of the RLO. Simple backgrounds with subtle colors or textures provide a good base for letters and graphics.

The most predominant design element is color since it initially attracts the viewer. Color schemes or relationships such as achromatic, monochromatic, analogous, direct complementary, split complementary, triad, tetrad, and double complementary should be used to maximize the color effect. Achromatic color schemes are based on black, white and gray and are the least effective in presenting an RLO. While some references suggest white letters on a black background, this combination is difficult to see and read. Monochromatic schemes (one color with a variety of tints and shades) can be very effective if several graphics or layers of information need to be presented. Analogous schemes (3 to 6 colors adjacent to one another on the color wheel, i.e. red, red-orange, orange, yellow-orange) can be one of the most effective and sophisticated schemes since the colors are related. The different complementary color schemes are also viable choices as long as direct complements of the same value and intensity are not used. For instance, red letters on a green background will appear to be vibrating and make it difficult for the viewer to read text.

Delivery

“Learning objects, created for global sharing, should be deliverable 24/7 without the need for a password and they should be searchable so that a student or teacher can easily find them, view the object’s description, and evaluate the likelihood of the RLO fitting into a course’s specific learning objectives. The Internet is generally considered the medium of delivery, but learning objects can be used or distributed in a number of different formats including, web pages, online course management systems such as WebCT and Blackboard, CD-ROMS, and instructor lead training. Ideally, RLOs should be accessible anytime and anywhere by using a web browser to request a lesson. But instructors might want to limit access by distributing a learning object via online course management systems, CD-ROMS, or instructor lead training, instructor lead training being the most limiting distribution method.

RLO Examples

Note: In most instances, descriptions of these web sites and RLOs were taken from the descriptions posted on each web site.

Interior Design

Interior design project for middle school students:

Cross curricular project for middle school students. Art, math, and vocational education concepts created by Kate Vannoy, Milwaukee Public Schools. <http://www2.milwaukee.k12.wi.us/audubon/pages/ITsite/spinning/> Students learned how to take measurements of their classroom. They turned those measurements into computer drawings (blueprints), and redesigned the

classroom in ways that would be more beautiful (aesthetic), and easier to use (functional).

Brain Dominance: RLO that uses simple and visual graphics to explain brain hemispheres and brain dominance. Then, the viewer can complete a "test" that suggests right or left brain dominance.

http://www.towson.edu/~mcmahon/generic/brain_dominance.swf

Teaching with Historic Places (national Park service—register for historic places): This site provides a series of RLOs based on historic sites, architecture and interior design. <http://www.cr.nps.gov/nr/twhp/index.htm>

Music Theory

Fundamental Musical Concepts – University of St. Thomas

The following exercises were developed by the Center for Multimedia Development [<http://www.stthomas.edu/cmd>] at the University of St. Thomas in support of our music appreciation course entitled "Understanding Music and Culture." Most of the exercises have both an "Explore" section, where students are introduced to terms and concepts and an "Exercise" or "Compose" section where students can experiment with those concepts.

<http://www.stthomas.edu/cmd/musicpreview>.

Reusable Learning Objects were developed around the following musical concepts; melody, rhythm, harmony, texture, musical form, properties of sound, basic media of music, musical systems, thematic development, sonata allegro, romantic song, and composition.

Teoria.com, an Online Theory Reference

José Rodríguez Alvira, a theory instructor at the Conservatory of Music of Puerto Rico, developed [teoria.com](http://www.teoria.com) an online music theory and ear training skills reference, <http://www.teoria.com/reference/index.htm>. José developed RLOs that both teach musical concepts and offer practice for example, in his music reading module he introduces staves, notes, clefs, etc and then provides interactive, configurable, practice modules for the students to practice or increase their skills in these concepts. You may check out one of José's examples of Secondary Dominants located at <http://www.teoria.com/reference/hf/secdom.htm>

The Tonal Centre

<http://dspace.dial.pipex.com/andymilne/index.shtml>

The Tonal Centre is an interactive site for music composers and theorists which explains and demonstrates some of the key concepts of *tonality*; including

[chords](#), [scales](#), [cadences](#), and [modulation](#). Most of the musical examples are illustrated with a midi file - just click on a relevant link to hear it.

The designers of this site stated that they developed the site for two audiences; composers who wish to expand their knowledge of tonal and scalar resources beyond that which is found in most conventional music theory publications; and music theorists looking for valuable resources of information and ideas which can be used for further exploration.

Summary

“The use of learning objects has the potential to increase the reusability of content, enhance students’ learning environments, share knowledge within and across disciplines, engage faculty in a dynamic community of practice, and save time and money in course development.”

“The probability of realizing this potential in higher education can be increased by:

- Coordinating projects and organizations active in their area (to learn from each other);
- Developing a common vocabulary and conceptual framework from which to share experiences;
- Collecting and evaluating practices to identify effective ones; and
- Systematically tackling the outstanding issues related to learning objects and policy, teaching and learning, development and interoperability, and management.” [NLII]

If you are developing a learning object that can be used globally, possibly for inclusion in the MERLOT database, you will want to evaluate its global accessibility, metadata standards (descriptive evaluation), and granularity (Is each module only dedicated to teaching one concept) and reusability. Representatives from each of the project’s stakeholder groups (students, instructors, subject matter experts, instructional designers, and media developers) should be the evaluators. [NLII]

Selected References

1. Connecting learning objects to instructional design theory: A definition, a metaphor, and a taxonomy by David A. Wiley, II, Utah State University Digital Learning Environments Research Group, The Edumetrics Institute, Emma Eccles Jones Education 227, Logan, UT 84322-2830, (435) 797-7562, dw2@opencontent.org
2. Rob Roberts, Graduate Student, SDSU Educational Technology <http://coe.sdsu.edu/eet/Articles/learnobject/index.htm>
3. Daniel, D. "Most Learning Objects Aren't." NYU Corporate Learning Services. Retrieved from the World Wide Web on April 10, 2003: http://www.cls.nyu.edu/vn_3/inside/articles/objects_aren't.html
4. Learning Objects, NLII Focus Session, October 10, 2003, The Blackwell Hotel, Columbus, Ohio. <http://www.educause.edu/nlii/meetings/nlii034>
5. Nissen, L., Faulkner, R. and Faulkner, S. (1994). Inside Today's Home. Harcourt Brace College Publishers.
6. Microsoft. Choose the right colors for your PowerPoint presentation, <http://office.microsoft.com/assistance/preview.aspx?AssetID=HA010120721033&CTT=6&Origin=EC010553071033>

Other RLO Examples

Elementary Music Education

Dallas Symphony Orchestra Doorway
http://www.dsokids.com/2001/rooms/DSO_Intro.html

Music History

120 Years of Electronic Music
http://www.obsolete.com/120_years/

Music for the Nation: American Sheet Music, 1870-1885:
<http://memory.loc.gov/ammem/smhtml/smhome.html>

The Orpheus Alliance - Patricia Gray at gray@colleges.org
<http://www.colleges.org/~music/modules/LOindex.html>

Music Technology

MIDI and Audio Resource
<http://www.borg.com/~jglatt/tutr/miditutr.htm>

UCSC Music Technology Background Essays:
http://arts.ucsc.edu/EMS/Music/tech_background/tech_background.html

Electronic Music Interactive <http://img.uoregon.edu/emi/emi.php>

The Classical MIDI Connection
<http://www.classicalmidiconnection.com/cmc/index.htm>

eMusicTheory.com. <http://www.emusictheory.com/practice.html>

German For Music Lovers:
http://www.acampitelli.com/german_for_music_lovers.htm

The Piano Education Page
<http://www.pianoeducation.org/>

EDUCAUSE 2001

LEARNING OBJECT/MODULE CHECKLIST

(Taken from the Educause 2001 presentation “The Promise and Pitfalls of Learning Objects: Current Status of Digital Repositories” by Kathy Bennett and Susan Metros. The checklists were adapted from the MERLOT Module Review Form)

Checklists are included for the Module Title, the Quality of Content, Usability, and the Potential effectiveness as a teaching tool

<i>Learning Object/Module Title:</i>
Brief description:
Location/URL:
Learning Goal:
Target audience:

	Quality of Content	Strongly Agree	Agree	Disagree	Strongly Disagree	N/A
				2		
	Is clear and concise					
	Demonstrates a core concept					
	Is relevant					
	Provides accurate information					
	Is flexible and reusable					
	Includes adequate amount of material					
	Summarizes the concept well					
	Quality of content very high					
	Overall rating					

	Usability	Strongly Agree	Agree	Agree or Disagree	Disagree	Strongly Disagree	N/A
	Is easy to use						
	Has very clear instructions						
	Is engaging						
	Is visually appealing						
	Is interactive						
	Is of high design quality						
	Overall rating						

	Potential effectiveness as a teaching tool	Strongly Agree	Agree	Agree or Disagree	Disagree	Strongly Disagree	N/A
	Identifies learning objectives						
	Identifies prerequisite knowledge						
	Reinforces concepts progressively						
	Builds on prior concepts						
	Demonstrates relationships between concepts						
	Is very efficient (one can learn a lot in a short period of time)						
	Overall rating						

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General RLO Development Checklist

Content

Practice

Assessment

<http://coe.sdsu.edu/eet/Articles/learnobject/index.htm>

<http://office.microsoft.com/assistance/preview.aspx?AssetID=HA010120721033&CTT=6&Origin=EC010553071033>