Learning Objects

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Outline

- History of Learning Objects (LOs)?
- What is a LO?
- Theoretical Framework
- LO Structure
- Creating LOs
- LO Standards
- Now-work

References

1. Koohang A. (2004). Creating learning objects in collaborative e-learning settings, “Issues in Information Systems”, V. 4, n. 2, pp. 584-590, http://www.iacis.org/iis/2004/Koohang.pdf

2. Ritzhaupt, A. D. (2010). Learning object systems and strategy: A description and discussion. Interdisciplinary Journal of E-Learning and Learning Objects, 6, 217-238. http://www.ijello.org/Volume6/IJELLOv6p217-238Ritzhaupt701.pdf

3. Smith, R. (2004). Guidelines for authors of learning objects. The New Consortium Multimedia. http://archive2.nmc.org/guidelines/NMC LO Guidelines.pdf

4. Thompson, K. & Yonekura, F. (2006). Practical guidelines for learning object granularity from one higher education setting. Interdisciplinary Journal of Knowledge and Learning Objects,1, 163-179. Available from http://ijklo.org/Volume1/v1p163-179Thompson.pdf

History of Learning Objects (LOs)

- Wayne Hodgins (learning and information futurist)
  - watching children playing with Legos
  - need for building blocks for interoperable pieces of learning – learning objects
- David Wiley
  - presented the analogy of an atom – a small component that can be combined and recombined to form a larger whole.
  - atom not a very good analogy - note every atom can be combined with another
  - “Learning objects are elements of a new type of computer-based instruction grounded in the object-oriented paradigm of computer science. Object-orientation highly values the creation of components (called “objects”) that can be reused in multiple contexts” Wiley 2000

What is a Learning Object (LO)?

- IEEE Defn: a learning object is defined as any entity, digital or non-digital, that may be used for learning, education or training.
- Wisconsin Online Resource Center: a LO is a new way of thinking about learning content
  - LOs are much smaller chunks of learning then courses, modules or units.
  - Interactive objects typically require 2 to 15 minutes for completion
  - LOs are self-contained, interactive reusable and able to aggregate.

Theoretical Framework

Constructivist Theory (Duffy and Cunningham, 1996) (Jean Piaget 1950)

1. Learning is an active process of constructing rather than acquiring knowledge
2. Instruction is a process of supporting that construction rather than communicating knowledge

Incorporating constructivist principles in LOs suggest they should be:

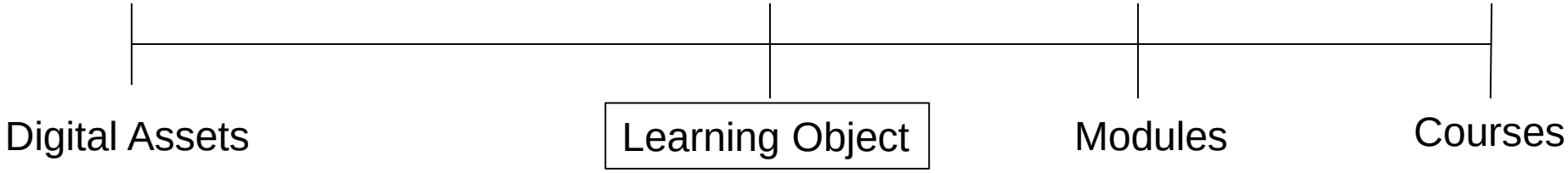
- accessible - can be distributed over the Internet
- reusable - different applications and learning contexts, varying devices
- Interoperable - use on different platforms
- adaptable – be sequenced in a way that adapts to learners needs

Theoretical Framework cont

Generative Theory (Bannan-Ritland, 2002)

- Requires the learner to manipulate, interpret, organize, or in some active manner makes sense of his/her environment
- The learner then creates meaning through generative associations between and among elements in the instructional environment and his/her knowledge base
- To incorporate generativist principles a LO system should allow:
  - Versioning – permit multiple versions of LOs to be in the system
  - Granularity – learner-produced artifacts to be generated on different prescribed levels according to levels in the taxonomy of LO types, and tagged according to standards.

LO Structure



1. **Learning objective** – each LO can address only one learning objective
   a) Task: What will the learner perform or complete?
   b) Conditions: Under which conditions should the learner achieve this objective?
   c) Criteria: To what degree should the learner achieve this objective?

Example:

- *Upon completion, you will be able to demonstrate an understanding of a **for loop** and draw a flowchart to compute the average of 10 numbers.*

LO Structure cont

2. **Content** – below are some considerations

- Should be succinct and direct; to the point
- May be in the form of text, audio, video, interactive media, or a combination of any of these
- Organize and partition your content in one screen sections (maximum of 250 words per screen)
- Content should include no more than 5 minutes of any one media type at a time
- Establish a **high-to-low level of importance** on how the organize content and maintain this approach
- Be **consistent** in how information is organized

LO Structure cont

2. Content cont

- Text, video, audio, images and interactive media that convey the facts, concepts, processes, procedures and/or principles of the subject matter should be included.
- Using a conversational tone writing style is appropriate
- Consider the inclusion of outlines with the main key concepts and principles; however, bulleted items are not enough. Note students will be accessing these learning object on their own.
- Use some method to organize content e.g., overviews, descriptions, demonstrations, diagrams, and examples (good and/or bad)
- References to sources used in the content

LO Structure cont

3. **Practice** – an LO provides and opportunity for learners to review facts, key concepts and principles through:
   - Exercises, instructional games, simulations, problem solving and guided reflections, or
   - Quiz-type self tests (i.e., multiple choice, true-or-false, etc.)

4. **Assessment** – an LO should assess whether the learner has achieved the stated leaning objective. May use the following:
   - Traditional assessment methods such as quizzes (i.e., multiple choice, true-or-false, etc.), or
   - Non-traditional methods such as games and simulations

Creating LOs

- Organize the course into various major segments
  - Example undergraduate software engineering course
  - Six major segments: 1- software process models, 2-requirements specification, 3-system design, 4-detailed design, 5-validation, and 6-maintenance
- Each segment can then organized into various themes
  - Segment 2 can be divided into 2 themes: Theme 1 - requirements elicitation and Theme 2 - requirements analysis
- Each theme includes at least one LO
  - Theme 1 can be divided into 3 LOs: scenarios, use cases, and use case diagrams

Creating LOs cont

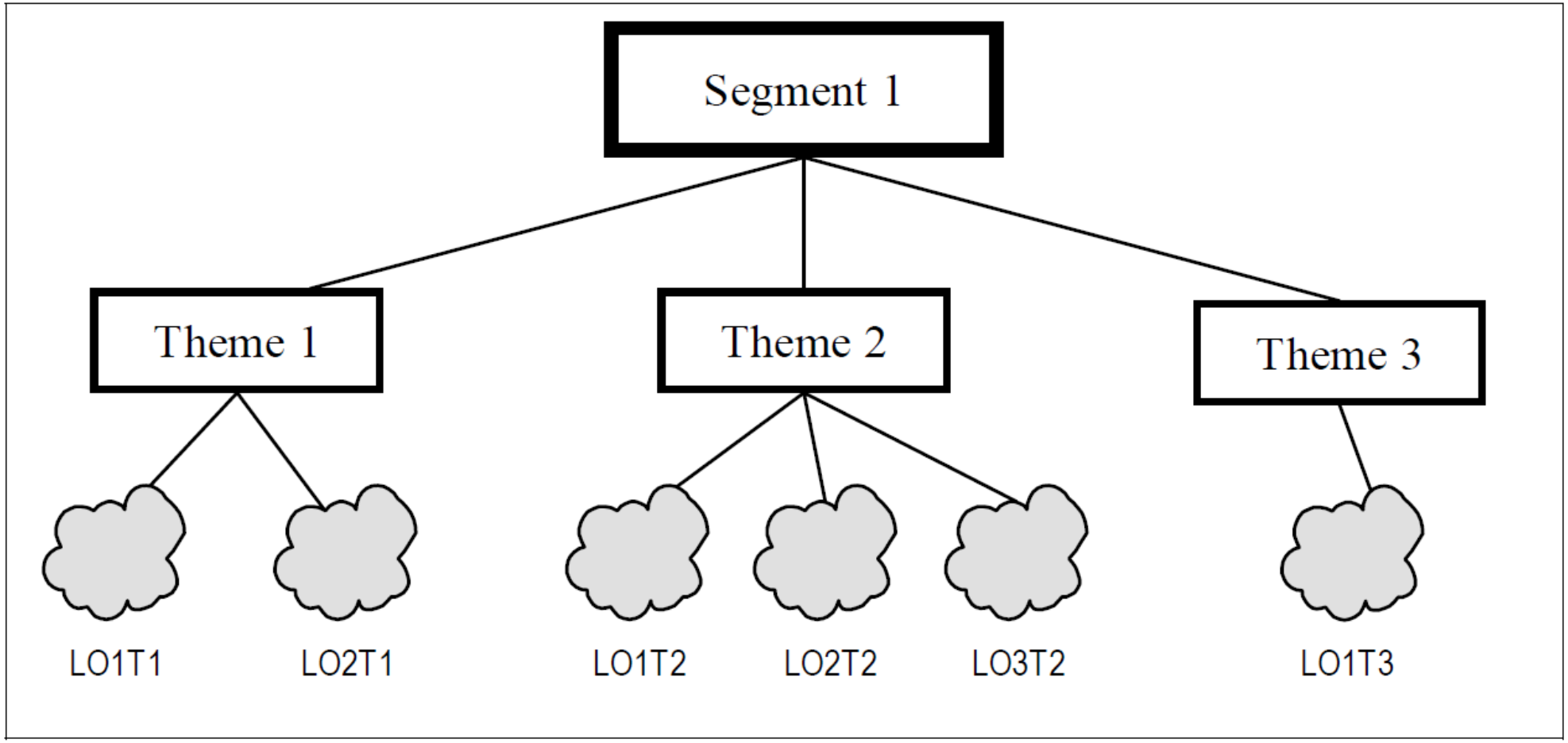


Figure: Process of creating LOs fro a segment of a course (Koohang, 2004)

Creating LOs cont

- Each LO may have a precedent LO and a subsequent LO
- Precedent LO is a prerequisite knowledge
- Subsequent LO knowledge beyond the current LO
- The precedent LO and subsequent LO maybe in the same theme or a different theme
- Each LO may be assigned a difficulty level e.g., beginning, intermediate, and advanced
- LOs may consists of one or more knowledge forms: text, audio, video, graphics, and animation

Creating LOs

Design to enable learning

- Keep your educational goal in focus
  - Always return to the question of “what educational problem are you trying to solve?
  - Avoid adding unrelated activities or features
  - Include only assets (images, text, video clips, sounds, etc.) that support your educational goal. Do not distract the learner from the goal

Creating LOs cont

Choose meaningful content that directly supports your educational goal

- Recognize and address common preconceptions learners may have about the content
- Use real world example where possible
- Make a connection between the content and the learner's own life situation
- Demonstrate new knowledge to the learner in a meaningful way
- Choose content and examples that are concrete rather than abstract
- Build on learners existing knowledge

Creating LOs cont

Present content in appropriate ways

- Different types of content are suitable for different formats of LOs
  - Largely images and text, a website format may be best
  - Activities that allow the learner to manipulate shapes or objects, a self-contained object may be best create using a multimedia tool
  - Browse existing digital LOs to get a feel for what is out there
- Some types of content are not suitable for LOs e.g., linear text-based (book-like) experience.

Creating LOs cont

Select appropriate activity streams

- Current theories of learning underscore the importance of student engagement, ownership of activities, and active involvement in the learning process
- Learners who are solving problems, drawing conclusions, comparing options and thinking about what they are doing are actively engaged in the learning process
- The LO content needs to exercise higher-order thinking skills of synthesis, analysis and evaluation.
- Offer the learner a choice of paths through the learning object.

Creating LOs cont

Select appropriate activity streams cont

- Offer a range of activities that address different learning modalities
  - Think about your educational goal and imagine creative activities to help learners achieve it. Use different modalities (visual, auditory and kinesthetic)
- Offer prompt and constructive feedback
  - Prompts users to take actions to correct errors
  - Avoid distractions, e.g., pop-up windows, animations, or loud sounds

Creating LOs cont

Consider assessment issues

- LOs do not include built-in assessment. Choosing a method of assessment is part of the problem:
  - should it be comprehension, indicators, like multiple choice quizzes?
  - should it be a written product like and essay? Or
  - should it take a the form of a time-on-tasks report
- Other issues with assessments
  - How do you know the learner actually did the assessments?
  - How much time was spent on task for a learning object?

LO Standards

- There are several standards that LOS can conform to including: Dublin Core, IMS Learning Resource meta-data model and SCORM.
- 1484.12.1™ IEEE Standard for Learning Object Metadata (2002)
- SCORM
  - The ***Shareable Content Object Reference Model*** defines a specific way of constructing Learning Management Systems and training content so that they work well with other SCORM conformant systems. (interoperable)
  - SCORM is widely adopted by some huge organizations. It has the critical momentum and is the de facto industry standard. The US Department of Defense has specified that all of its content must be delivered via SCORM.

LO Standards - metadata

- ***general*** [0:1] Container element for general metadata.
  - ***identifier*** [0:many] Container element for a value that identifies this learning object.
  - ***title*** [0:1] Title of the course
  - ***language*** [0:many] The language(s) this learning object uses to communicate with the learner.
  - ***description*** [0:many] A textual description of the learning object.
  - ***keyword*** [0:many] One or more keywords describing the learning object. Each keyword entry may contain more than one word if the entry represents a phrase.

LO Standards cont

- general [0:1]Container element for general metadata cont.
  - ***coverage*** [0:many] Describes the scope (time, culture, geography, region, etc.) of the training in the learning object.
  - ***structure*** [0:1] Describes the organizational structure of the content. (atomic, collection, networked, hierarchical, linear)
  - ***aggregationLevel*** [0:1] Functional granularity of the learning object (1=smallest level of granularity [raw asset], 4=highest level of granularity [complete course])

Now-work

- Using the CS 1 syllabus provided (CIS 133J: Java Programming I, Portland Community College – CSC 2013 Final Report)
  - Identify the segments of the course
  - For any segment, identify the themes
  - For any theme identify the LOs that may be created

Summary

- Introduce the concept of a learning object (LO)
- Briefly introduce the theoretical underpinnings of LOs
- Described the structure of LOs
- Described the guidelines to use when created LOs
- Briefly introduce LO standards