eLearning and Learning Objects

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Contents

• What I hope to achieve in this presentation
• Demonstrations of some learning objects
• e-learning, Learning Models, Learning Standards & learning objects
• Background of learning objects
• Some implementations of learning objects
• Some issues on learning objects
• Future of learning objects
What I hope to achieve in this presentation

• Connection between learning objects, learning standards and e-learning
• Discuss some issues pertaining to the concept of learning objects and their implementation
Demonstrations

1. Example learning objects:
   http://www.londonmet.ac.uk/ltri/learningobjects/examples.htm

2. Cooperative Program for Operational Meteorology, Education and Training (COMET Program):
   http://meted.ucar.edu/norlat/snow/index.htm

3. Golf examples:
   http://testtrack.scorm.com
Evolution of Technology-Based Training

Instructor-Led Training-ILT

Mainframe-Based Computer-Based Training 1960s–1970s

Satellite of Ground Based Video “Distance Learning” 1980s–1990s

LMS Beginnings AICC Standards

First Generation Web-Based Training 1988

Integrated Blended Learning Web, Video, Audio

Blended Learning

2000 onwards

(Source: The Blended Learning Book by Josh Bersin)
Technology Generations

- Mainframe
- Personal Computer
- Web
- Ubiquitous Access

Late 60s to early 80s

NOW
Scope of e-Learning

Difficult to apply properly

Very messy!

Easiest to implement!

Content

Technology

Pedagogy

Internet
Wireless
PDA
Tablet PCs
Streaming Video
LMS
CMS
LCMS
Digital Library
...

Learning Objects
Lesson Notes
Assessments
Tutorials
Lab Notes
Case Studies
...

Blended Learning
Problem-Based Learning
Project-Based Learning
Social Constructivism
Discovery Learning
Peer Learning
...

Difficult to apply properly
Standards and Interoperability

- AC Power (120/220 volts)
- DC Power (airplane, car)
- Internet (CAT5, 802.11 a/b/g/n)
- USB 1.0, 2.0, 3.0
- Video VGA, HDMI (High Definition Multimedia Interface)
E-learning Standards

• Standards reduce the costs and risks involved in introducing new products and techniques.

• Standards allow new products and online services to be introduced alongside the systems already in place.

• Open standards maintain a level playing field for all players, new and old.
Microsoft licensed SCORM technology from HunterStone

SCORM Tools
Sharable Content Object Reference Model (SCORM) content authoring standards allow seamless conversion of Microsoft Office and web documents into standards-based objects – reusable by any SCORM conformant learning management system. Enhanced functionality transforms teachers and trainers into interactive learning creators with a few simple mouse clicks.
International E-learning Standards Organizations
Goals of E-learning Standards

• **Reusability** – ability to use content again for a different purpose

• **Accessibility** – make the web usable for people with visual, auditory, and other physical disabilities, including cognitive processing disabilities & visually impaired elderly web users e.g. the WCAG (Web Content Accessibility Guide) from W3C

• **Interoperability** – make content work in different systems, e.g. AICC, IMS, SCORM

• **Durability** – need to support the longevity of the learning content
Looking at learning models
Traditional Model

The push model
Traditional ISD

Instructional System Design

Management

Trainer

Learning Content

Learner

Analysis

Design

Implementation

Evaluation

Instructional System Design
Existing Model

Working = Learning
Working & Learning

- Competency data
- Business results
- Informal knowledge
- Learning Content
- Trainer
- Learner
- Co-worker
- Management Content
- Subordinate Client
- Manage
- Co-
Evolution

From
• Focus on Instruction
To
• Focus on **Outcomes**

From
• Know it all
To
• **Just in time**

From
• Computer Based Trg.
To
• **Blended learning**

From
• Individual pedagogy
To
• **Social pedagogy**

From
• Lone Learner
To
• **Learning together**

From
• e-learning
To
• **Learning**
Is there still a place for ISD?

• Yesterday’s model

The waterfall model
Is there still a place for ISD?

- Task-specific
- Stable design
- Big $$$, lots of time
- Training-specific

Analysis ➔ Design ➔ Implementation ➔ Evaluation

Start Here

- Working & learning ecosystem
  - Competency requirements
  - Business requirements

- Focus on strategy
  - Flexible
  - Reconfigurable

- Short time
  - Automation
  - Cannibalize & reuse
  - Make new content standards-compliant

Analysis ➔ Design ➔ Implementation ➔ Evaluation

360°
Is there still a place for ISD?

• Yesterday's model
  Task-specific
  Stable design
  Big $$$, lots of time
  Training-specific

• Today's model
  Focus on strategy
  Flexible
  Reconfigurable

Working & learning ecosystem
  Competency requirements
  Business requirements

Analysis
  Design
  Implementation
  Evaluation

360°

Short time
  Automation
  Cannibalize & reuse
  Make new content standards-compliant
The Content Delivery Challenge

Learning Content

Bandwidth
- Gigabit
- Broadband
- Modem
- Sporadic connection
- Offline

Delivery device
- Desktop computer
- Limited resolution laptop
- PDA
- Mobile device ("phone")

Rendering
- Language requirements
- Perceptual accessibility requirements
- Motor accessibility requirements
- Other accessibility requirements

Learner
Learning Objects - 1

• Definition of learning object has long been debated (Friesen, 2003; Parrish, 2004; Schatz, 2005; Wiley, 2002).

• Debate is about:
  – What is a learning object?
  – What a learning object is meant to achieve?
Learning Objects - 2

• Learning objects are
  – short instructional components that are
  – products of a design strategy and
  – software techniques
• whose goal is to facilitate their
  – discovery and
  – reuse.

(Patrick Parrish, The COMET Program).
Learning Object - 3

A typical definition for a learning object:

• A sequence of **learning events**
• Often around a **single objective**
• Often comprised many **RIOs** (Reusable Instructional Objects)
• Often with internal **assessment/feedback** for the learner
• Not necessarily course specific (**context free**)
Learning Objects – 4

• Inspired by the software engineering paradigm of object-oriented programming.
• Programming -> engineering discipline; Instructional technology -> design discipline
• Can instructional content be regarded like programming code?
• To avoid confusion, some people call learning objects as “online learning resources” (Littlejohn, 2003)
Learning Objects - 5

• One important purpose of learning objects is to encourage the reuse of the learning content.

• Design approaches for reuse:
  – Divide instructional content & activities into discrete, coherent units
  – Create metadata for discovery
  – Context-free design
Where we are

* Learning Activity
  * Single Participant
  * Single Resource
  * Multiple Competencies
The Point

We want to go from A to B

Measure Learner Performance

Learning Activity
- Participant
- Competencies
- Resource

Learning Activity
- Context
- Participant(s)
- Competencies
- Resource(s)
Some Implementation Models / Templates for Learning Objects

- SCORM’s Content Aggregation Model
- CISCO’s RLO/RIO Strategy
- Adobe’s Learning Object Approach
- NETg’s Learning Object Model
Content Aggregation Model (CAM) in SCORM
Asset

• Electronic representations of media such as text, images, sound, or any other piece of data a web client can deliver

• The most basic form of content
• Can be reused in many different contexts and applications
Sharable Content Object (SCO)

• Comprised of one or more assets that becomes an independent, defined piece of instructional material
• The smallest logical unit of information you can deliver to your learners via an LMS
  – In technical terms, a SCO is defined as the only piece of information that uses the SCORM Application Programming Interface (API) for communication with an LMS.
Data Model Elements - 1

• Enable tracking and storing of data about learner performance in, and interaction with, instructional content interoperably
  – Every LMS must support all data model elements in SCORM 2004
  – Use of data model elements in content is optional
Data Model Elements - 2

- **Technical initialization**
  - Launch data
  - Entry
  - Location
  - Mode
  - Credit
  - Suspend data
- **Content initialization**
  - Maximum time allowed
  - Learner ID
  - Learner name
  - Learner preference
  - Completion threshold
  - Time limit action

All mandatory in SCORM 2004

- **Score reporting**
  - Score
  - Progress measure
  - Scaled passing score
  - Success status
  - Objectives
  - Interactions
  - Completion status
- **Comments**
  - Comments from learner
  - Comments from LMS
- **Exit data**
  - Exit
  - Session time
  - Total time
Content Package

• A standardized, interoperable way to upload content to a SCORM-compliant LMS

• A SCORM content package contains two principal parts:
  – The **XML manifest file** that lists
    • All of the resources or assets you want to include in the package
    • The content structure diagram you created (called the organization)
    • The sequencing rules
    • All of the metadata for the SCOs, the aggregations, and the package itself
  – All of the physical SCO and asset files for the content package
CISCO’s Learning Object Model

Course
Collection of modules

Reusable Learning Objects:
Learning objects that meet 1 and only 1 learning objective.

Reusable Information Objects:

Raw Content Items: Text, Media, Sound, Images, etc...
CISCO’s RLO/RIO Strategy
Cisco’s Learning Objects

From: http://www.bitpipe.com/data/detail?id=962198364_445&type=RES&x=933961370
Learning Object Development

- Content Item: Min 5/Max 9
- Topic/RIO: Min 5/Max 9
- Lesson/RLO
- Module
- Course
- Curriculum

Granularity: More → Less
Adobe Learning Object Approach

The Objective, Learning Practice & Assessment can all be packed into a physical file.
NETg’s Learning Object Model - 1
NETg’s Learning Object Model - 2

3 components in a NETg’s Learning Object

LEARNING ACTIVITY

ASSESSMENT

OBJECTIVE
Content Ecosystem
## Correspondence between Models - 1

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Reusablelearning.org’s Content Model</th>
<th>CISCO’s RLO/RIO Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Learning Environment</td>
<td>Course</td>
</tr>
<tr>
<td>2</td>
<td>Learning Component</td>
<td>Module</td>
</tr>
<tr>
<td>3</td>
<td>Learning Object</td>
<td>Lesson (RLO)</td>
</tr>
<tr>
<td>4</td>
<td>Information Object</td>
<td>Topic (RIO)</td>
</tr>
<tr>
<td>5</td>
<td>Content Asset</td>
<td>Screen / Page / Asset / Element</td>
</tr>
</tbody>
</table>
## Correspondence between Models - 2

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Reusablelearning.org’s Content Model</th>
<th>SCORM’s Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Learning Environment</td>
<td>LMS + Content Package</td>
</tr>
<tr>
<td>2</td>
<td>Learning Component</td>
<td>Content Package</td>
</tr>
<tr>
<td>3</td>
<td>Learning Object</td>
<td>Content Package</td>
</tr>
<tr>
<td>4</td>
<td>Information Object</td>
<td>SCO</td>
</tr>
<tr>
<td>5</td>
<td>Content Asset</td>
<td>Screen / Page / Asset / Element</td>
</tr>
</tbody>
</table>
## Clark’s 5 Content Types

<table>
<thead>
<tr>
<th>Content Type</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concept</strong></td>
<td>A category that includes multiple examples</td>
<td>Democracy</td>
</tr>
<tr>
<td><strong>Fact</strong></td>
<td>Specific &amp; unique data or instance</td>
<td>William Shakespeare wrote Hamlet</td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>A flow of events or activities</td>
<td>Photosynthesis</td>
</tr>
<tr>
<td><strong>Procedure</strong></td>
<td>Task performed with step-by-step actions</td>
<td>Chemical titration</td>
</tr>
<tr>
<td><strong>Principle</strong></td>
<td>Task performed by adapting guidelines</td>
<td>Principle of Archimedes</td>
</tr>
</tbody>
</table>
Evaluating Learning Objects

• Is the learning object appealing overall?
• Is the experience of using the learning object a pleasant one?
• Are the technical requirements easily understood and easily met?
• Is it easy to find your way around the learning object?
• Is the content complete and correct?
• Are the activities appropriate to the content?
• Is the scope of the learning object suitable: neither too limited, nor too general for your purposes?
• Does it mean the educational goal you decided upon?

(Source: Guidelines for Authors of Learning Objects by Rachel Smith)
Future - 1

• Rodney Brooks, robotics expert and director of MIT’s Computer Science & AI Lab:
  – **Neural interfaces** for computer technologies:
    • Allow people to interact with computers and computer-driven utilities through their thoughts
    • People can be free of devices like keyboards and mouse devices

• Future e-learning development team:
  – Cognitive scientists, computer scientists, software engineers, artists, philosophers & stand-up comedians!
Future - 2

Neural interfaces to computer technologies
Future - 3

- In the foreseeable future it is possible for us to have every
  - online document,
  - training tutorial,
  - animation,
  - game,
  - webcast,
  - podcast, or
  - whatever other forms learning objects might take,
- conveniently stored in our pockets or purses – iPhones or iPods.
Future - 4

- Various types of learning objects, e.g.
  - content objects,
  - strategy objects,
  - discourse objects

- Instructional design using learning objects is actually **context design**.
End of Presentation

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