



SI
INTERNATIONAL

Learning Objects and Knowledge Objects: Birds of a Feather or Different Species Altogether?

John W. Ruffner, PhD and Nina Deibler
SI International, Inc.



LEARN. TRAIN. WIN!

Outline

- ❖ Background
- ❖ Research Questions
- ❖ Literature Review
- ❖ Lessons Learned
- ❖ Real-life Examples
- ❖ Conclusion



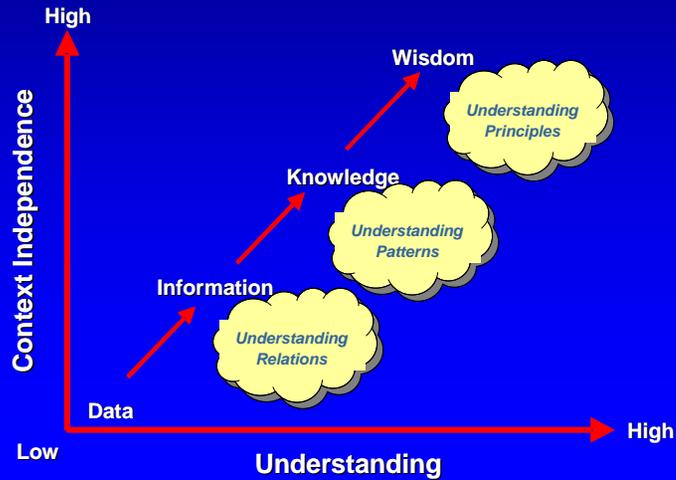
Background

- ❖ Learning Objects (LOs) and Knowledge Objects (KOs) are essential building blocks for learning and performance.
- ❖ The relationship between KOs and LOs is not very well understood.
- ❖ Three possible LO-KO relationships are
 - KOs are equivalent to LOs.
 - KOs are structural components of LOs.
 - KOs are separate, unrelated entities.
- ❖ There is an need to define KOs, their components, structure, and relationship to LOs.

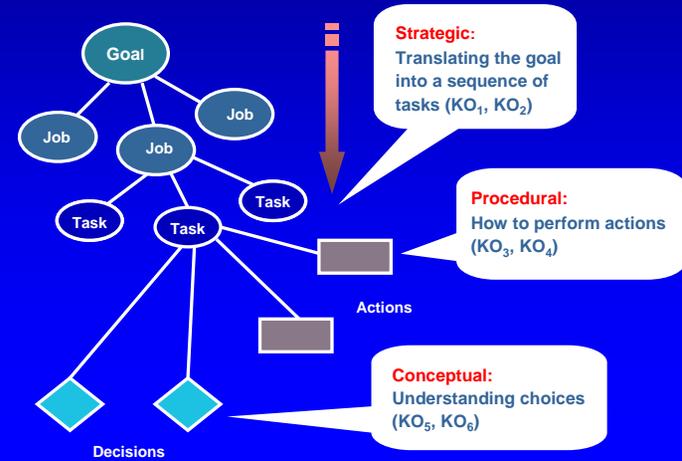
Research Questions

- ❖ What are the characteristics of, and differences among, KOs and LOs?
- ❖ How can our experience with LOs be leveraged to developing and using KOs?
- ❖ What are known best practices for developing and deploying KOs?
- ❖ What are known best practices for converting KOs to LOs and LOs to KOs?

Literature Review



Gene Bellenger



William Horton



David Merrill

Literature Review (cont'd)

An interrelated set of data, information, knowledge, and wisdom.



Bellenger

A digital object consisting of structured and organized content but without instructional features.



Merrill

A chunk of individually accessible digital content that accomplishes a single goal.



Horton

Lessons Learned

- ✓ **LOs and KOs are structurally and functionally inter-related digital objects with some differences.**
- ✓ **KOs can be augmented to create LOs, and LOs can be decomposed to become KOs.**
- ✓ **LOs and KOs should be developed initially to be relatively context free to increase their reusability.**
- ✓ **Structured KOs should be developed and managed in an object-oriented repository.**

Real-life Example

LO

Information Objects



HAZMAT Transportation Context



KO

Learning Objective

Select the proper publication for the specified mode of transportation.

Instructional Strategy

Publication Governing Transportation of Hazardous Materials

Modes of Transportation and Governing Regulations

In this lesson you will be given a brief overview of the regulations used in the transportation of hazardous materials. Proper shipment of hazardous material and the associated training requirements of DOD personnel are governed by these regulations.

Governing Regulations	Transportation Modes Governing Regulations		
	Land	Air	Vessel
Title 49 Code of Federal Regulations (49 CFR)	X	X	X
DOD 4500.9-R	X	X	X
International Maritime Dangerous Goods (IMDG) Code			X
Air Force Manual (AFM) 24-20463		X	
International Air Transport Association (IATA)			X

Learning Activities

Publication Governing Transportation of Hazardous Materials

International Air Transport Association Dangerous Goods Regulations (IATA)

The International Air Transport Association Dangerous Goods Regulations (IATA) is used for commercial air transport hazardous materials. The IATA is an industry standard used by all shippers of hazardous materials as contained in. It incorporates all the requirements of the International Civil Aviation Organization (ICAO) which regulates the transportation and identification of hazardous materials for transportation by civil aviation. It also includes the associated training requirements to be performed involved in the transportation of hazardous material by air.

Assessment Activities

Which of the following would be the most appropriate publication to use if you were transporting hazardous materials from the United States to Japan via a maritime vessel?

- 49 CFR
- AFM 24-20463
- DOD 4500.9-R
- IMDG
- IATA

Real-life Example (cont'd)

The repository interface displays a list of documents on the left, a large text area in the center, and several hazard labels at the bottom. The labels include a yellow 'RADIOACTIVE 7' label, a blue 'DANGEROUS 4' label, and a red 'FLAMMABLE GAS 2' label. A yellow arrow points from the 'FLAMMABLE GAS 2' label towards the learning object on the right.

Repository

The learning object is titled 'Hazardous Material Classes' and 'Class 2: Compressed Gases'. It provides a definition of Class 2 and lists three divisions with their respective hazard labels: 1. Division 2.1 (Flammable Gas), 2. Division 2.2 (Non-Flammable Gas), and 3. Division 2.3 (Poisonous Gas). The interface includes navigation buttons like 'Study Aids', 'Glossary', 'Progress', 'Back', 'Next', 'Search', 'Help', and 'Close'.

Learning Object

Conclusion

**LOs and KOs
are birds of a feather
and
not different species altogether.**



QUESTIONS?

Here's our contact information...

John W. Ruffner, PhD
SI International, Inc.
Oklahoma City, OK
john.ruffner@si-intl.com

Nina Deibler, MAS
SI International, Inc.
Pittsburgh, PA
nina.deibler@si-intl.com

Back-Up Slides

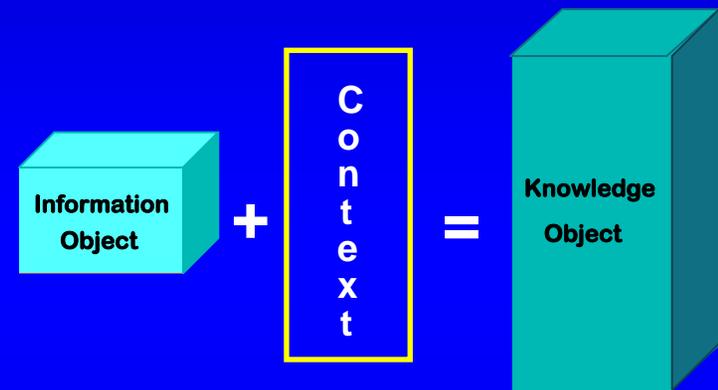
Learning Objects: Some Definitions

Definition	Source
Any digital or non-digital entity for learning, education or training	LTSC, 2002
A small, self-contained unit that can be aggregated and meta-tagged	WORC, 2000
Any digital resource that can be reused to support learning	Wiley, 2000
A modular, uniquely identified and meta-tagged digital resource to support learning	NLII, 2008

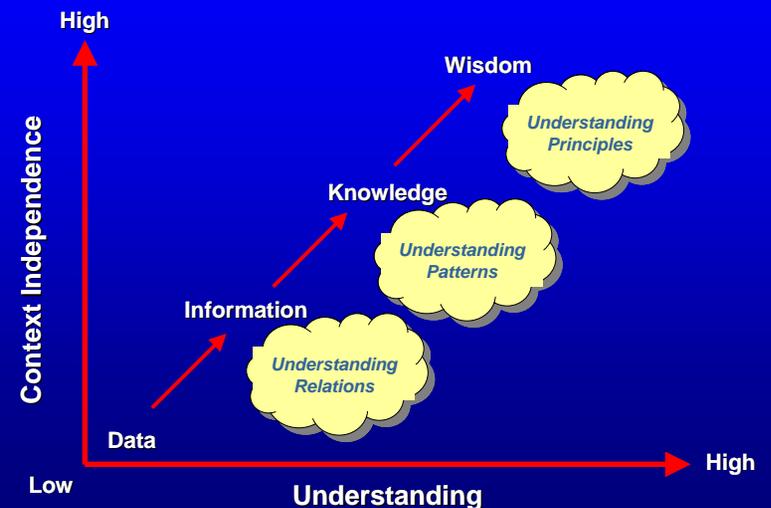
Gene Bellenger

❖ A KO is an inter-related set of data, information, knowledge, and wisdom.

❖ A KO an information object that has been meaningfully contextualized.



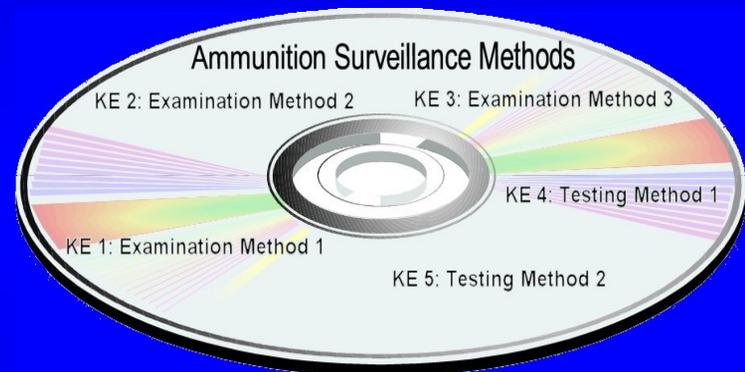
❖ A KO It is most valuable with high context independence and high understanding.



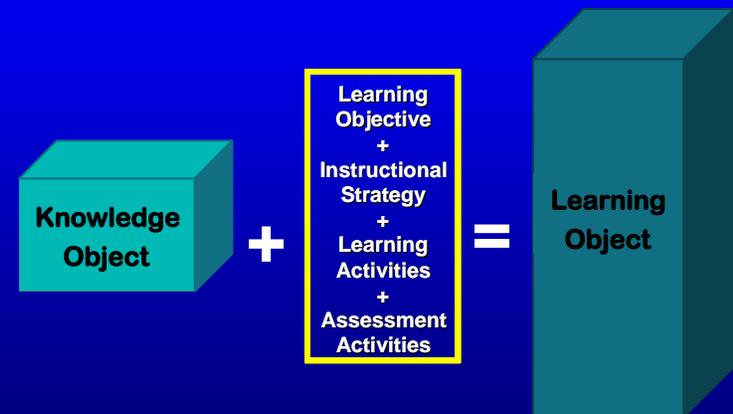
David Merrill

❖ A KO is a digital object consisting of structured and organized content without any instructional features.

❖ A KO has compartments for different knowledge elements (KEs).

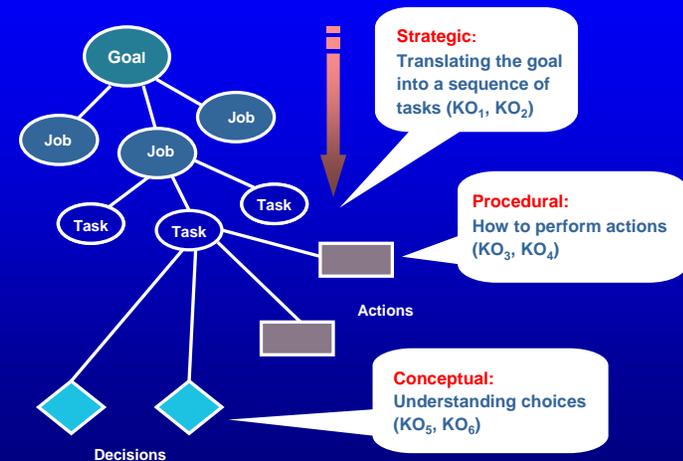
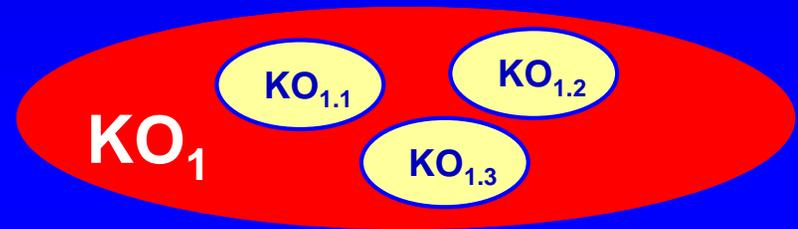


❖ Adding instructional features to a KO can produce an LO.



William Horton

- ❖ A KO is a chunk of individually accessed electronic content that completely accomplishes a single goal.
- ❖ A KO can be part of a larger KO and can in turn include smaller, subordinate KOs.
- ❖ Effective use of KOs required understanding of tasks and knowledge required to perform a job.



Terminology

Adopt the following definitions:

❖ Information Object

A granular, reusable chunk of data or reusable digital content a user can access directly that contains no context or associated learning objective, activities, strategy, or assessment.

❖ Knowledge Object

A highly structured and interrelated chunk of contextualized content that contains no associated learning objective, activities, strategy, or assessment.

❖ Learning Object

A collection of IOs and KOs with meaningful context, and with associated learning strategy, activities, and assessment that support a learning objective.

Processes

- ❖ Consider the potential use of **KOs as LOs**, and **LOs as KOs** early in the design process.
 - KOs can be augmented to create LOs, and LOs can be decomposed to become KOs.



Processes

- ❖ **Ensure LOs and KOs have appropriate content and structure, which may involve**
 - **Changing the content development processes.**
 - **Retraining of content developers and KM personnel.**
 - **Creating content with relatively low levels of context (users assign meaning later).**
 - **Shifting the focus of design and development efforts from “course development” to the development of highly granular objects that could serve as KOs when appropriate.**

Categorization and Discoverability

- ❖ **Facilitate the discoverability, usability, reusability, and conversion of KOs and LOs by**
 - **Developing a standard metadata schema based on the IEEE LOM and a standard metadata vocabulary.**
 - **Registering LOs and KOs in the ADL Registry.**
 - **Storing LOs and KOs in a central, web-based repository.**

Technical Format

- ❖ **Include metadata directly in the structure of the KOs.**
- ❖ **Author KOs and LOs using a standard XML content schema such as DITA or S1000D.**
 - **Allows more control over output formats as well as integration of metadata.**
- ❖ **Develop and manage structured KOs in an object-oriented repository.**
 - **Enables dynamic assembly at the time of need.**