An Educational Taxonomy for Learning Objects

Giselher H.J. Redeker
Visionite AG i.Gr., Germany
gredeker@visionite.de

Abstract

Current discussions within the standardization process of Learning Technology are mainly focused on economical opportunities and technical aspects of so called learning objects. Surprisingly little discussion is about instructional or didactical issues. The purpose of this paper is to conceptualize a didactical taxonomy of learning objects and a didactical metadata approach for the facilitation of reusable instructional navigation patterns.

1 Introduction

Numerous standardization syndicates have been founded during the last few years. Their goal has been to define open technical standards for computer supported learning environments and education products and their characteristic metadata. The most important initiatives are the Aviation Industry CBT Committee (AICC)[1], the Instructional Management Systems Project (IMS)[2], the Alliance of Remote Instructional Authoring and Distribution Networks for Europe (ARIADNE)[3], the World Wide Web Consortium (W3C)[4], and the Advanced Distributed Learning Initiative (ADL)[5].

Following the initial independent running of these standardization endeavors, especially the IMS and ADL have now begun an attempt at harmonizing results and, within the framework of an IEEE Learning Technology Standards Committee (IEEE LTSC)[6] work group, are establishing an internationally recognized and expandable standard.

Within these groups the main focus is on the financial opportunities that may arise, but surprisingly there is scarcely a discussion about the didactical or instructional design implications of learning objects (cf. Wiley 2002).

Consecutively I conceptualize an educational Taxonomy for Learning Objects for the facilitation of generic sequencing strategies.

[1] http://www.aicc.org
[2] http://www.imsproject.org
[3] http://www.ariadne.unil.ch
[4] http://www.w3.org
[5] http://www.adlnet.org
[6] http://www.manta.ieee.org

2 Learning Objects

A learning object reduces the knowledge of a specific theme to its most essential unit. LOs may be divided into even smaller LOs. At its most basic level, a learning object is made up of several knowledge units (KUs) which may consist of texts, audio and video presentations, or animation. At this point the problem of granularity of learning objects arises. Following Wiley (2002, p. 10) "the decision regarding learning object granularity can be viewed as a trade-off between the possible benefits of reuse and the expense of cataloging. From an instructional point of view, alternatively, the decision between how much or how little to include in a learning object can be viewed as a problem of scope. While reality dictates that financial and other factors must be considered, if learning is to have its greatest chance of occurring, decisions regarding the scope of learning objects must also be made in an instructionally-grounded, principled manner."

A heuristic approach helps to balance between economical and instructionally-grounded criteria: The most basic learning object is understandable on its own and coherent, which means without references to other learning objects.

3 Hierarchy of learning objects

Course: Courses are defined as a sequence or network of learning units.

Partial Course: Being containers, partial courses can comprise learning and knowledge units as opposed to learning units, which are solely made up of knowledge units.

Learning Unit: Learning units[7] are containers for thematically related knowledge units. Learning units are self-contained and can be, for example, reused in another course. The learning units' structure and order are defined as the macrostructure of the learning environment. Learning units can be classified according to a three-tier thematic outline into fields (highest level), areas (second level), and themes (lowest level).

[7] The definition in this context is based on essays by Merrill (no year given) who speaks of so-called knowledge objects in conjunction with his instructional-transaction-approach.

Proceedings of the The 3rd IEEE International Conference on Advanced Learning Technologies (ICALT'03)
0-7695-1967-9/03 $17.00 © 2003 **IEEE**

Knowledge Unit: Knowledge units are the smallest elements of knowledge. Knowledge units constitute the components of a learning unit within which they can be flexibly combined. The respective structure and order of knowledge units within a learning unit is defined as the learning environment's microstructure.
Three different types of knowledge units can be distinguished:

1. *Receptive* knowledge units
2. *Internally interactive* knowledge units the size of the smallest interactive learning sequences (up to 5 minutes) and
3. *Cooperative* knowledge units which have no time limits and are defined by communicative tasks.

The learner's role in the respective learning objects varies:

- *Receptive learning objects* place the learner in the role of merely consuming information, i.e. he or she is receptive. The learner's activity takes place outside of the module regarding the selection of a particular module, the order of the modules, as well as the time spent on the modules.
- *Internally interactive learning objects* integrate the learner in the human-computer-interaction. The learner is either CBT guided - albeit in a mini-CBT sequence - or is given the framework of his or her activities via simulation.
- *Cooperative learning objects* demand communicative activities of the learner such as brainstorming, debating, or problem solving with other learners in a group.

Each knowledge unit is thus typed according to the following didactically relevant dimensions:

1. In the *thematic dimension*
2. In the *competence dimension*
3. In the *dimension of media presentation forms*
4. In the *knowledge dimension*
5. In a *relational dimension*

4 Outlook: Generic navigational patterns

Within this conceptual framework courses are defined as a sequence and/or network of learning units. The goal of further development is to implement so-called *generic navigational structures* based upon the hierarchy concept and didactical typification in order to support writing and learning processes.

Generic navigational structures relate to the question of how teaching contents should be sequenced, in more concrete terms, which pre-structured navigation opportunities should be presented to the learner in the learning environment.

Transparency of relationships existing between knowledge units and between learning units respectively forgoes this kind of regulated navigation.

The number of modules for a certain topic form a learning unit. The learning process within a learning unit is called a micro-process. It is – as in conventional lessons – extremely adaptive, meaning dependend upon the situation (upon learning type, communication among other marginal conditions). Depending upon the topics, the internally complex learning units are linked according to semantic networks and/or cognitive maps (knowledge maps). This structure is called a macro-didactical structure.

These generic navigational structures are to be understood as analogue to a guided tour, as recommendations, not as strict regulations. An author giving a guided tour suggests the navigation sequence but does not make it mandatory (although this should also be possible). In the same way, the system suggests navigation structures according to certain marginal conditions. Such navigation *recommendations* could be: exemplary teaching/learning in the micro-field with a top-down-structure in the macro-field, spiral in the macro-field, and action oriented in the micro-field, to name a but a few. Such system structures are to be seen as a didactical advice the learner can follow but does not necessarily have to.

5 Literature

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