Chapter 4.13
Adaptable Navigation in a SCORM Compliant Learning Module

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ABSTRACT

This chapter is about the use of metaphors and adaptable navigation in the context of the technological standard SCORM. Our theoretical focus is on hypertext navigation in SCORM compliant learning modules and the potential of adaptable navigation metaphors within this standard. In the empirical section, we present a case study about navigation design and usability evaluation of a learning module prototype. This learning module was developed for the subject matter of steady-state modelling in process systems engineering, and features an adaptable navigation with a novel process control metaphor. We conclude with a discussion on the didactical value of navigation metaphors and adaptability in SCORM, and provide some suggestions for future research in this area.

INTRODUCTION

Standardisation is regarded as an important issue for the sustainability of hypermedia systems in education and training. The Sharable Content Object Reference Model (SCORM) is a set of technological specifications for designing Web-based learning materials, established by the Advanced Distributed Learning initiative (ADL) of the US Department of Defense (ADL, 2002). While technological standards like SCORM are often considered to be didactically neutral we will show that there is a need for research on the pedagogical implications of this standard to develop more sophisticated guidelines for the didactical designers. In this chapter, we will focus on the didactical potential of metaphors and adaptable navigation in SCORM. Our theoretical argument is completed with a case study, which presents

the design of a learning module prototype and an empirical usability evaluation study. The module features an adaptable navigation with a novel process control metaphor, which was especially developed for the subject matter of process systems engineering. We assumed that metaphors support the didactical coherence of a modular SCORM course and that adaptable navigation allows the users to access the learning objects according to their individual goals and preferences. We will discuss if the findings of the evaluation study provide evidence for these assumptions and identify questions for further investigation.

BACKGROUND

Navigation in SCORM

An essential characteristic of SCORM—as of other technological standards for e-learning—is modularity. A SCORM course consists of several sharable content objects (SCOs or objects). An object is the "smallest logical unit of instruction" (Learning Systems Architecture Net [LSAN], 2003) and represents a single instructional objective. It is composed of one ore more (multi)media files, called assets. Each object is conceived as a stand-alone lesson which can be integrated into different courses or learning modules without modification. Therefore, the content of an object must be independent from its context (i.e., the other objects of the learning module). In consequence, hyperlinks can only refer to assets within the sharable object in which they are set. It is not possible to set hyperlinks from a sharable object to any other sharable object—even of the same module—nor to any other reference outside the object. This strong restriction in the interlinking has been discussed by Clark (2003):

A course built from such learning objects consists of a set of completely isolated sets of activities or information with no cross-referencing, much like a book written under the rule that nothing written on any one page can refer to anything written on any other page. There clearly are enormous pedagogic assumptions built into any learning platform that embodies such a structure. It would seem to be fair to say that in this instance the technological imperatives have driven the pedagogic stance of the product. (p. 4)

Clark (2003) points out that the strict segmentation of the learning content into separated pieces is problematic for many disciplines. From a didactical point of view, it is clear that the interchangeability of single isolated learning objects is limited—especially in complex domains like engineering, which build on several basic disciplines. Some learning atoms will only make sense within larger molecules. Another problem concerning the shareability of learning objects is that there is no general consensus about the granularity of learning goals (Wiley, 2003), which determines the size of the objects (each meant to represent a single goal, see above). As a result, it is technologically easy to create a course of various SCORM compliant objects while it still might be difficult to integrate sharable objects from different sources into a didactically coherent learning module.

We propose to distinguish three different levels of didactical design in the context of SCORM:

1. **Micro level:** didactical design of single sharable objects.
2. **Meso level:** didactical design of a learning module composed of several objects.
3. **Macro level:** didactical design of the curriculum which can include a broad variety of instructional settings, methods and media.

In this chapter, we concentrate on the meso level, on which the task of the didactical designer consists in organising the structure for the content objects of a module in an xml file, the manifest. ADL (2002) has developed guidelines for