

A Semantic Learning Objects Authoring Tool

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INTRODUCTION

The introduction of computers is recreating a new criterion of differentiation between those who become integrated as a matter of course in the technocratic trend deriving from the daily use of these machines and those who become isolated by not using them. This difference increases when computer science and communications merge to introduce virtual education areas, where the conjunction of teacher and student in the space-time dimension is no longer an essential requirement and where the written text becomes replaced (or rather complemented) by the digital text (García & García, 2005).

In order to rescue those educators who have much to offer in an educational system, whether virtual or presential, as authors of teaching resources, suitable authoring tools should be designed, thinking more in the pedagogical process than in the technical aspects.

Hypertext Composer, or simply HyCo, is one of these authoring tools, which presents a pedagogical interaction model that makes easier the creation of educational resources for every teacher/author, independently of his or her computer expertise level. At the same time, HyCo is an authoring tool and a retrieval tool, in that it encapsulates all the complexity in handling current tools within the facilities that the author needs and offers, as a result, a hypermedia teaching product that can be distributed in different formats for the user's access.

HyCo has an important semantic basis that nears this tool to the Semantic Web concept (Berners-Lee, Hendler & Lassila, 2001) and allows creating Semantic Learning Objects (SLO) that could be im-

ported for more specialized Learning Management Systems (LMS). In order to achieve the semantic definition of the created educational resources, HyCo uses Learning Technology Standards or Specifications (LTS), looking for obtaining contents that are able to work in other systems (interoperability), follow-up information about learners and contents (manageability), usability in other contexts (reusability), and avoiding obsolescence (durability).

This article is devoted to introducing HyCo as an authoring/retrieval tool of SLOs, which presents an interaction model that hides all the technical complexity to the authors but, at same time, offers all the power of semantic definitions in order to publish or use the contents in advanced e-learning environments. The rest of the article is organized as follows: the Background section establishes the background of the presented topic, making a comparison with related works; the HyCo Authoring Tool section presents the HyCo authoring tool; finally, the sections Future Trends and Conclusion provide the future trends and the remarks of the article, respectively.

BACKGROUND

There are many different hypermedia authoring tools that could be used in order to produce hypermedia systems for the education domain. Some of them are commercial ones, whereas many others have been developed for educational and research goals. HyCo has no commercial ambitions for now, and we decided to develop our own solution in order to achieve our research goals, which include seman-

tic, adaptive, and collaborative issues; some of them are presented in the actual version, some are in working prototypes, and others will appear in future versions.

First, it is important to say that HyCo inherits properties from the two main trends in hypermedia systems: closed and open hypermedia systems. The former ones store both content and hypermedia structures internally (monolithic systems) or in a database. External application or information cannot participate easily or be included in the hypertext system. These systems produce self-contained hypermedia systems, but they do not support heterogeneity and particularly do not support hypertext distributed over multiple heterogeneous managers, while the open hypermedia systems have the ability to integrate distributed information and the property to store their content outside the hyperbase, especially keeping linking information separate from documents and allowing for more powerful link structures.

HyCo presents a reader mode, in which the hypertext can be navigated within the tool in a self-contained way like in classic authoring systems such as IRIS Intermedia (Yankelovich, Haan, Meyrowitz, & Drucker, 1988) or Storyspace (Bernstein, 1991, 2002). These two systems are significant representatives of the so-called closed hypermedia systems, which store both content and hypermedia structures internally (monolithic systems) or in a database. In addition, HyCo has voice synthesis capabilities in order to make more accessible the developed hypertext system. The differentiation of the author and reader roles in the same authoring tool differs from other systems, which only present authoring capabilities as MS FrontPage (<http://www.microsoft.com/frontpage>).

About the use of external vs. internal links, HyCo follows a compromise between these approaches by storing links internally but representing them externally. Links are stored inside the educational resource; in this way, users do not have separate link files that could cause wrong opening operations. But HyCo links are represented separately and compactly rather than being spread implicitly throughout the system. This idea is based on the link system of Storyspace v2 (Bernstein, 2002) and Chimera (Anderson, Taylor, & Whitehead, 2000) instead of the embedded link model of HTML.

Related to the semantic characteristics, a similar proposal can be found in HYLOS (Hypermedia Learning Object System) (Feustel & Schmidt, 2001). This system is devoted to creating ELearning Objects (ELOs) instead of HTML pages. In this case, they complete the contents with its metadata to compound an ELO. The used metadata are a subset of the LOM (Learning Object Metadata) (IEEE, 2003) instead of the IMS Metadata (IMS, 2003c) used in HyCo.

HyCo AUTHORING TOOL

HyCo is a powerful authoring tool for educational purposes, which means that an author can create hypermedia educational resources with it. But the same tool also could be used to access created contents in a read-only mode by a student or reader.

HyCo is a multiplatform tool—it does not force the use of one concrete platform. The idea is that if we want teachers to use it, they should work in the context in which they feel good. The actual version of HyCo works in the wider range of operating systems; for this reason, Java 2 Standard Edition technology (Sun, 2004) was chosen as a development base.

The main goal of the authoring tool is the creation of educational contents while trying to achieve an independence of the final publication format. There exists a clear separation between the contents and its presentation. In this way, the educator writes the contents once and reuses them every time he or she needs them. In order to achieve this goal, HyCo tool uses an internal XML-based format (Bray et al., 2004) to store the educational contents of the produced electronic books. Precisely, the HyCo XML-based format allows the introduction of LTSs in this authoring tool; specifically, HyCo supports IMS specifications (IMS, 2003a, 2003b, 2003c) and EML (Educational Modeling Language) (Koper, 2001).

Separating the content and the presentation forces offers authors a way to generate an independent result of the authoring tool. In this way, HyCo has an output gallery that supports HTML, PDF, TXT, RTF, SVG, and PS output formats.

HyCo's user interface has two main facilities that improve its usability. First, this authoring tool has an internationalized interface that actually sup-

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