Modeling educational content with XML

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Introduction

Electronic learning environments are rapidly being developed by different suppliers. Most institutes for post-secondary education are evaluating some of them or have implementations at a smaller or larger scale. At the Open University of the Netherlands (OUNL) all 350 courses for all academic degree programmes (economics, cultural sciences, law, business administration, psychology, engineering, environmental science and public administration) are supported with an integrated and personalised electronic learning environment based on a variety of internet-services (WWW, News, Ftp, Email, real-time conferences).

One of the problems encountered when implementing electronic learning environments at a larger scale is the availability, use, re-use, development and preservation of educational content in the broad definition of the concept:
- linear and interactive learning materials,
- study tasks and other instructional devices,
- tests and assessment procedures of all sorts (e.g. self assessment, peer assessment),
- curriculum specifications,
- role-specifications of actors involved in education and the specification of supporting devices for different actors.

The suppliers of electronic learning environments implement different approaches in the modelling of educational content. Some use proprietary file formats, like word processor formats or files from authoring environments for computer based instruction, which can be uploaded to the system and used as learning content. Other suppliers follow the strategy of allowing content to be edited with forms into a web-browser (mostly plain text format with some formatting codes), which functions as a front-end to a database store. Others use HTML as the primary language for content editing.

The first two approaches are problematic in the sense that content is managed in proprietary formats which restricts the accessibility, the re-use of parts of the content in other systems and the preservation of content for future use.

The HTML-approach has the advantage of using a standard language (controlled by the W3C) which preserves the investments in content. The problem is however that HTML is too restricted as a language for educational content modelling. It has a fixed number of tags which can only express the presentation structure of the content and is not able to express the educational model used in the content components. So searching for specific elements in a content repository, e.g. test-items, is not possible. Another major problem is that the assembly of new documents from old documents in a sensible and automated way is problematic and as a result the individualisation of content is difficult.

Development of EML: Educational Markup Language

To address the problems mentioned above we are working on a large scale project, named the ELON-project (Education and Learning ONline). One of its subprojects is to define a markup language for the development and exchange of educational content. The language is an XML (eXtensible Markup Language) application and models different educational components, like study tasks, competency maps, test-items, study books (for personalised delivery). At this moment in time a large part of the educational markup language is developed and tested. This is the part in which 'units-of-study' are defined. The Units-of-Study part of EML contains a structure of about 300 elements and attributes which are grouped in four categories:
- Meta-data, like title, author, copyright, bibliographic data (Dublin Core),
- Student group and subgroup specifications,
- Learning activity sequences, including interactions, collaboration, assessment procedures, assignment of activities to subgroups, et cetera.
- Learning environment modelling, including learning materials of all sorts, instruments used in education, electronic communication facilities, rooms and persons (actors) involved in the learning process (e.g. tutors, experts). All specifications are for online (virtual) as well as real world components, because most educational settings will always have a mix of both options.

At the conference we will present the principles behind the language and show examples of units-of-study built in EML based on different pedagogical approaches (e.g. competency based learning, problem based learning).