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▶ **To cite this version:**

Dimitris Karagiannis, Martin Nemetz, Sabrina Fochler. Web-based course design on the basis of eduWeaver and advancements. Conference ICL2007, September 26 -28, 2007, 2007, Villach, Austria. 6 p. hal-00197253

HAL Id: hal-00197253

https://telearn.hal.science/hal-00197253

Submitted on 14 Dec 2007

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Web-based course design on the basis of eduWeaver and advancements

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Key words: *E-Learning, Instructional Design, (Re-Usable) Learning Objects*

Abstract:

EduWeaver is a courseware tool that should enable instructors to create digital learning objects, which are conform to didactical standards, and to eventually combine them to a whole course. The course structure of course models, which were designed in eduWeaver, is hierarchically classified into four different layers. Via the export functionality in eduWeaver that relies on current standards, the course can be used in diverse learning management systems or within another environment as e.g. HTML Pages. Thus, courses can be exported in various formats, which have been upgraded by implementing current standards, such as SCORM 2004. In order to increase the attractiveness of eduWeaver for current as well as for future users, the tool has to be subject to an evolution-based development in the area of user interactions.

1 Introduction

The idea of developing reusable learning objects and thus gaining a modular assembly of courses led to the processing of eduWeaver[1]. The frame for the design of learning objects and in succession of eduWeaver was the project eduBITE (Educating Business and Information Technologies) [1]. eduBITE, which was financed by the Austrian "Bundesministerium für Wissenschaft und Forschung" within the initiative "Neue Medien in der Lehre" (new media in education), targeted the deployment of teaching materials, instruments and a communication platform [2]. This means that teaching materials were generated in form of learning modules in order to use them within a multimedia environment; instruments were built *"[....] to categorize developed material according to the IEEE international metadata standard."* [2] Figure 1 shows the settlement of eduWeaver within the e-Learning environment. In the centre LMS (Learning Management Systems) that support the importing of course (structures) according to SCORM V.1.2, SCORM 2004, XML or others, can be found. In order to provide the LMS with courses, eduWeaver can be used for course planning, administration, as well as for versioning, and this in sequence entails on the one hand to enlarged effectiveness for teachers and on the other leads to more convenience for students. *Wiley* states that first of all the provision of learning objects increases the speed and efficiency of the instructional design of courses and secondly authoring tools have to be able to operate across different platforms. The courseware itself as well as the content should be reusable for being able to consider different levels of complexity. [3]

[1] More information in eduWeaver can be found at http://www.eduWeaver.net. Please feel free to register for a free account for eduWeaver. eduWeaver itself is a web-based tool, i.e. no additional software has to be installed on a computer. Rather, all that is required is an Internet browser.

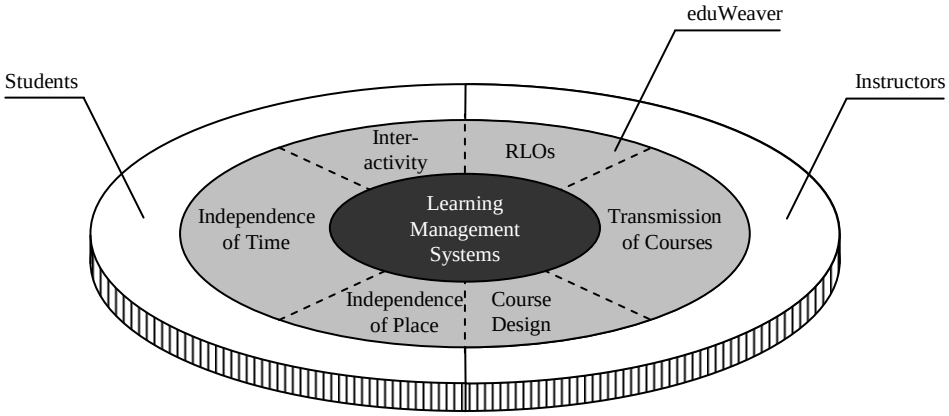

Figure 1: Positioning of eduWeaver

2 Instructional Design with eduWeaver

The tool eduWeaver represents a solution for the instructional design of courses in the area of e-Learning. The user, who could be defined as a teacher, a professor, a lecturer or as an instructor in general has the possibility of dividing courses into modules and in series into lessons and Learning Objects (a more detailed description on the structure of courses can be found in [9] as well as in [4], where this structure has been applied in the technical realisation of eduWeaver). Furthermore, the tool eduWeaver disposes several interfaces (see figure 2). They were developed in order to assemble several conjunctions between eduWeaver, LMS, instructors, as well as between the pools of course sequences and learning material, respectively.

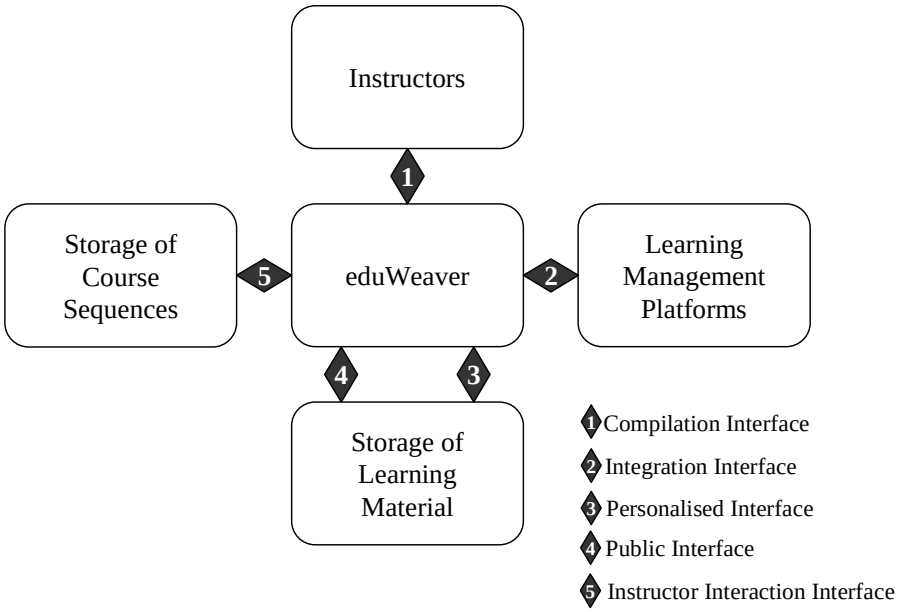

Figure 2: Interfaces of eduWeaver with its Environment

Instructors feed eduWeaver with course structures and learning materials via the Compilation Interface, where they commit the quantity and sort of learning materials and/or course structures that could be used in eduWeaver.
Learning Management Platforms (e.g. Blackboard, Moodle etc.) are platforms where edited course structures and learning materials can be imported from eduWeaver through the Integration Interface.

The Personalised Interface permits the storage of own learning materials within a personal pool of Learning Objects, though the materials are published through the Public Interface in eduWeaver. The application of learning materials is possible only in accordance with the respective author.
The storage of courses contains their sequences and structures and is directly connected with eduWeaver via the Instructor Interaction Interface.
Through the Storage of learning materials instructors may use the same materials in a variety of their offered courses, as it is depicted in figure 3.

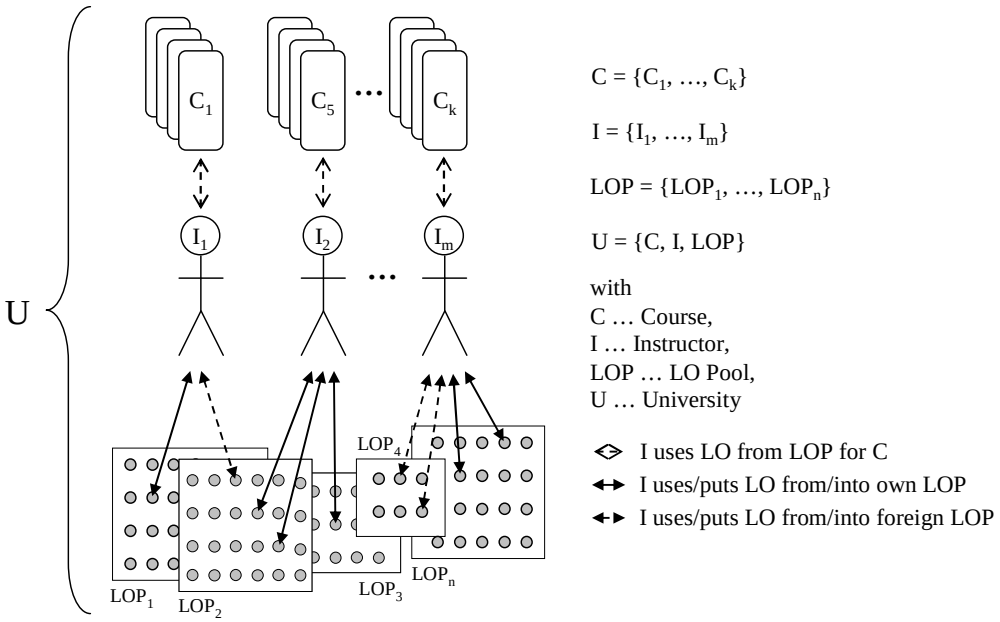

Figure 3: Storage of Learning Materials and LOs for Course Design

By relying on the above-mentioned structure of courses [5], [9], [10], [11], learning materials that is encapsulated in so-called Re-Usable Learning Objects (RLO) can be used in many course settings. Imagine for instance a lecturer, who teaches on three institutions, whereas first, the courses (C_k – C_{k+n} in figure 3) have got a different level due to differing basic knowledge of students, and second, these institutions rely on diverse Learning Management Systems (e.g. Blackboard, Moodle, and Ilias). By using eduWeaver, the lecturer (I_m in figure 3) can construct his three courses on the basis of so-called Learning Object (LO) Pools, whereas, if desired, he could insert LOs that belong to him (permanent arrow) or those that belong to other authors (dashed arrow).[2]
eduWeaver constitutes a method based on ADVISOR®, whereas figure 4 provides a better comprehension of the processing of eduWeaver. The basis of eduWeaver is its reliance on a meta-model architecture, whereas based in the meta[2]-model ADVISOR®[3], different model types (Course Map, Course Model, Module Model, Lecture Model and the LO Pool) have been implemented on a meta-model level. By using the instances of these meta-models (i.e. the models) instructors could design their courses in a very modular and intuitive way. Also the diverse export functionality that will be described on the reference of SCORM 2004 in the next section can be easily applied by relying on the meta-model structure.

[2] Certainly, the lecturer could only apply LOs of other authors, if they agree on foreign usage. In a future instance, eduWeaver will provide a role model extension, with which questions of property and foreign usage of LOs could be met.
[3] ADVISOR® is a Product of BOC Information Technologies Consulting GmbH.

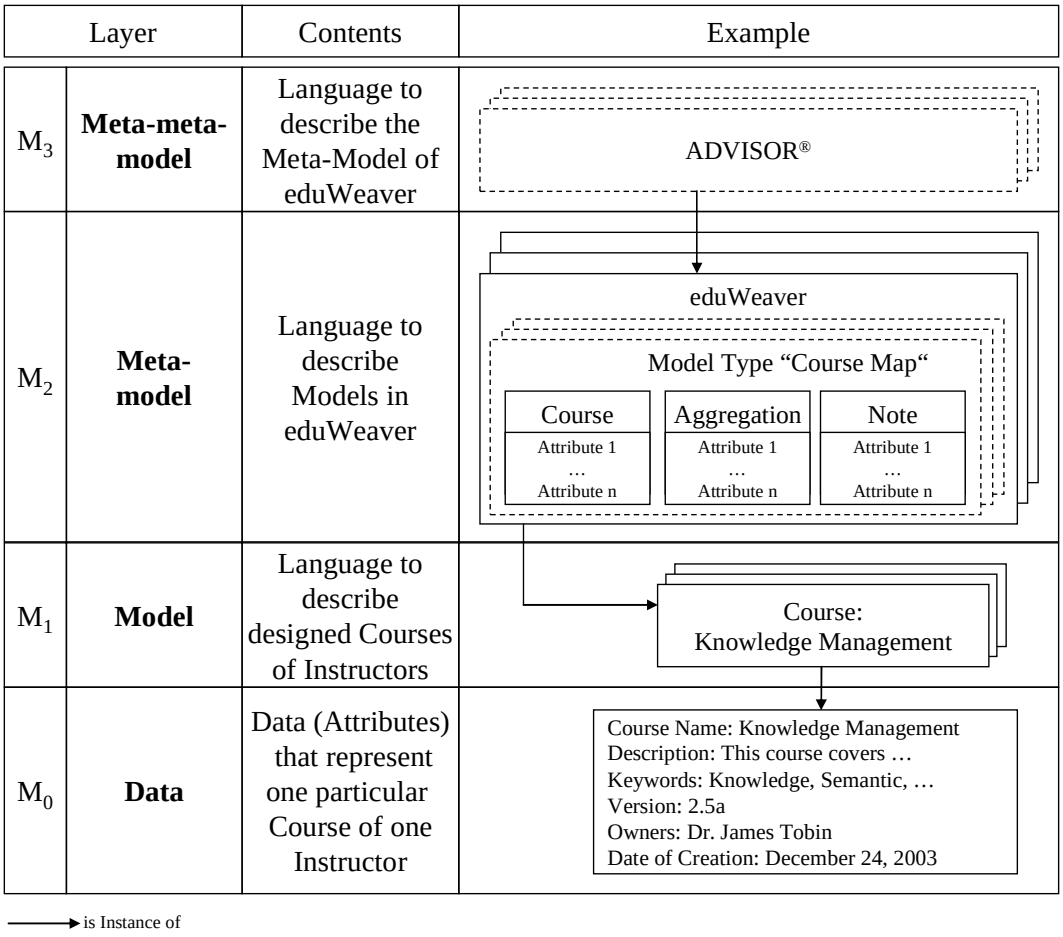

Figure 4: The Meta-Model Approach Applied on eduWeaver [6], [12], [13], [14]

3 The future of web-based course design with eduWeaver and advancements

In the following, advancements in exporting courses will be described, whereas the SCORM 2004 standard will be used as a reference.
The standard SCORM 2004 has been developed by the Advanced Distributed Learning Initiative (ADL) and represents a reference model, in order to create packages of Learning Objects, which can be used in all compatible LMS. The SCORM 2004 package includes a manifest file together with physical files of the SCO (Sharable Content Objects). Additionally, the integration of description files into the SCORM 2004 package is inevitable, as they represent the description files, which characterise the meta-data files of the SCO [7]. The integration of the Learning Objects' meta-data into the SCORM 2004 package has been realised by a matching of elements of the activity tree of the SCORM 2004 standard on the one hand and the meta-data of LOs in eduWeaver on the other.
Table 1 depicts a small excerpt of the above-described matchings, whereas it represents the modelling objects of each layer (i.e. course structure) in eduWeaver. Attributes provide room for specific information of all layers within a course (e.g. course structure). The Learning Object Metadata (LOM) represent elements of the corresponding activity tree in SCORM 2004 [15] and were assigned to the attributes of eduWeaver.

Class	Attribute (in eduWeaver)	LOM (SCORM 2004)
Course Map	Name	General/Title
	Description	General/Description
	Keywords	General/Keyword
	Version	LifeCycle/Version
⋮	⋮	⋮
LO	Name	General/Title
	Description	General/Description
	Keywords	General/Keyword
	Language	General/Language

Table 1: Matching the SCORM 2004 Standard to eduWeaver

IMS Learning Design (LD) is an open standard and specification, respectively that offers the possibility of creating e-Learning courses by considering different approaches. In fact, IMS LD provides three different levels: level A, level B and level C, whereas level A supports basic functionality, level B adds properties, global elements, monitor services and conditions and level C supports notifications. It must be noted that the majority of available tools support level A of IMS LD only, yet still a small number of tools is ready for the usage of level B of IMS LD. [8]
At present the project team of eduWeaver is developing a concept for the implementation of IMS LD in eduWeaver. The work that has been done so far concerns the matching of elements of the IMS LD specification to the attributes of eduWeaver in a similar way as it has been realised with the elements of SCORM 2004. The reason why the concept for IMS LD as well as its implementation in eduWeaver is not highly advanced, rests on the fact that the majority of Learning Management Systems are still working on the supply of IMS LD.

4 Conclusion

Although it seems that eduWeaver is a useful invention in the area of the instructional design for e-Learning courses, further technical developments and the users' constantly ascending expectations demand continuous technical advancements.
This paper gives a survey of the enhancements on which the eduWeaver project team is currently working. Especially the updating of standards for exports, e.g. SCORM 2004 and IMS LD are important areas for improving the usage of eduWeaver, as they broaden the possibility of its employment. The standards themselves can only be exploited by constantly extending the course attributes of eduWeaver, which is also a part of work that is momentarily under way.
As eduWeaver relies primarily on its usage by instructors, it is planned to integrate an online opinion board that should enable a direct contact channel between instructors on the one hand and developers of eduWeaver on the other.

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