

eduXX – The Instructional Design Platform

Dimitris Karagiannis

Judit Bajnai

University of Vienna, Institute of Computer Science and Business Informatics

Department of Knowledge Engineering

Bruenner Str. 72

A-1210 Vienna, Austria

Phone: +43 1 4277 38481

Fax: +43 1 4277 38484

E-Mail: [dkljudit]@dke.univie.ac.at

ABSTRACT

Instructional design is one of the main challenges today's teachers face when transforming their teaching method from classical classroom-based teaching into ICT-supported education, into e-education. Not only the didactics used have to be changed, the teaching process is different due to virtual groups and asynchronous communication among them. Beside these the main problems during this transformation derive from the question how to reuse the books, lecture notes and slides of the classroom teaching in order to be able to provide them in a multimedia-proper way through a learning management system. This paper provides a solution for teachers facing these three specific problems when taking their first steps towards e-education.

Keywords: Instructional Design, Process Modeling, Courseware Design, Reusable Learning Objects, Content Packaging, E-Education, Meta-Modeling Platform

1. INTRODUCTION

Teachers face many demanding tasks when trying to keep up with the upcoming waves of new education. They are challenged by the possibility to develop new instructional forms through the integration of information and communication technologies into their every day work, into teaching.

The generic term e-learning or e-education does not properly describe what is happening in today's teaching. The letter "e-" meaning using the internet and information technology for teaching is only the technical

part to be solved. The maximum added value to classroom teaching can be offered by new media only if new instructional models, from the didactic point of view, are created.

For solving these problems – the technical one as well as the didactical one – teacher's need professional support in following aspects:

- Creating didactical models for e-learning, in order to realize the new aspects of information and communication technologies within instructional design.
- Managing and easily creating e-learning-compatible teaching materials using their own resources like books, lecture notes and slides, in order to become independent of expensive and inflexible multimedia developments in the educational sector.
- Simulating and optimizing educational processes regarding times and costs, in order to make the highly praised advantage of e-learning regarding less costs and time savings measurable.

To provide teachers with a tool that integrates these supporting functionalities and helps them to bridge the gap between classroom teaching and the new e-education, is the challenge that was accepted in the last years and is introduced within this paper.

The answer to this challenge is the development of the Instructional Design Platform – eduXX.

2. TOOL DEVELOPMENT

Before drawing the whole picture of the eduXX platform that provides teachers with the functionalities introduced before, an overview of the development stages are given. These stages are compliant with the development of the functionalities introduced before.

The Platform ADVISOR®

The eduXX Instructional Design Platform is based on the meta-modeling tool ADVISOR®. [ADV]

ADVISOR® is a product of BOC Information Technologies Inc. [BOC], developed within an ESPRIT project of the European Union from 1998 until 2000. ADVISOR®'s main feature is its method independence. This means that, starting from the ADVISOR® meta tool level arbitrary instructional modeling tools can be derived. Such tools are represented by so-called method libraries, which allow particularly the definition of arbitrary modeling languages without any programming effort. [JRK01] For facilitating an easier access to the offered modeling possibilities a specific method was implemented from the ADVISOR® meta level.

ADVISOR® realizes the first functionality teachers need, namely the support at creating new didactical models for e-learning, in order to realize the new aspects of information and communication technologies within instructional design.

Based on the idea of Business Process Re-Engineering ADVISOR®'s main functionality is to provide a platform for the realization of any modeling methodology in order to design courses. It can be utilized as a professional management tool for designing and optimizing training processes and for managing training materials easily. [KaBa01]

The creation of new instructional processes is supported by a graphical modeling surface which allows teachers to represent different educational scenarios. Further the organizational model of any educational institution can be represented and referred to in different parts of the teaching process. Nevertheless ADVISOR® is regarded as a meta-modeling platform which can be easily extended by further functionalities.

In the existing, basic implementation form ADVISOR® is a ready-to-use management toolkit for the training and learning industry, providing several basic functionalities

mainly in the field of instructional process modeling. Figure 1 offers an overview of these basic functionalities:

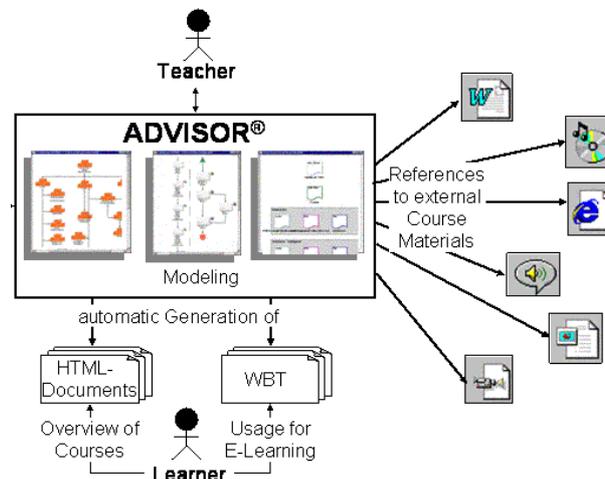


Figure 1: ADVISOR® and its interfaces

The graphical modeling surface allows to easily implement and compare different and new instruction designs.

Based on the modeling core, interfaces to external course materials are given for any common document format, so that existing lecture notes, slides, documents, HTML-pages, etc., can be linked into the instructional process. This way teachers can decide freely about their teaching materials by not having set any restrictions regarding document formats. Based on the completed instructional processes, HTML-pages showing the course structure and having links to the above mentioned teaching materials can be automatically generated. These HTML-pages are easy to use for simple web-based-trainings, accessed by the learners.

As part of the modeling functionality, ADVISOR® gives training companies the possibility to manage not only their training materials professionally and flexibly but also to keep an overview of their staff by using the "Working-Environment-Model". The linkage between the instructional processes and this organizational model of the educational institution, the first step towards times and costs simulation, is already done.

To sum up it can be said that ADVISOR[®], as an educational management tool, covers the needs of the whole educational industry. With its functionalities instructional processes can be easily modeled and teaching material can be professionally managed. From existing training materials computer based or distance learning courses can be extracted and designed.

The target group of ADVISOR[®] are independent training consultants, educational institutions like universities, virtual schools, and also the human resource development department of large companies in any industry, that provide in-company training.

ADVISOR[®]'s emphasized flexibility derives from the meta-modeling possibility, that allows to develop different methods for course design. This point leads us to the next step of development, the realization of a highly sophisticated instructional design method – eduWeaver.

The Method eduWeaver

In 2001 an Austrian project called eduBITE [eduB, StBa03] (Educating Business and Information Technologies) started. The main focus of this project was the development of an instructional design method called eduWeaver [BaSt03] at the University of Vienna. EduWeaver is based on the meta-modeling platform ADVISOR[®] [BOC]. Within this meta-modeling platform the e-learning specific courseware modeling method eduWeaver was implemented. During this implementation phase ADVISOR[®] was extended by further functionalities.

eduWeaver supports teachers by creating new e-learning courses reusing existing multimedia learning objects [Cis00] created and provided by different higher educational institutes in Austria. Besides this modeling functionality, that is already known from ADVISOR[®], eduWeaver also realized the functionality mentioned in the introduction regarding the management and easy creation of e-learning-compatible teaching materials using existing resources like books, lecture notes and slides.

Figure 2 shows the general architecture of this method.

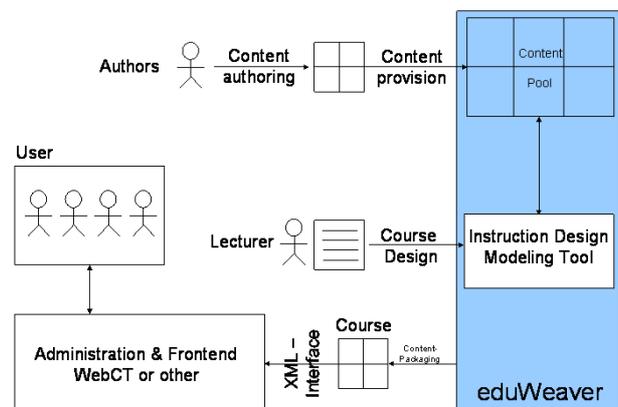


Figure 2: General Architecture of eduWeaver

eduWeaver provides teachers with a so called “content pool” for content management of existing teaching materials. This content pool is linked with the modeling core of eduWeaver, offering a graphical tool in order to do instruction design work. eduWeaver also offers a standardized interface for IMS content packaging [IMS] in order to provide e-learning courses within a learning management system. In the following the modeling core is introduced in detail.

eduWeaver consists of four modeling levels. Each level contains learning construct instances that correspond to the model types Course, Module, Lesson and Learning Object Use. These model types are hierarchically linked to each other by internal references. Within each modeling level sequences of instruction can be graphically modeled by using according object and relation classes representing different granularities of the process level.

Figure 3 shows an example for the modeling level 4, the Learning Object Use. Here the object classes “start”, “learning object” and “end” are instanced, connected with the relation class “follows”. This process describes the teaching materials used in one lesson, in this particular case these are three, sequentially ordered learning objects. Further this figure also gives an impression of the user interface of eduWeaver providing different menus on the top, the modeling classes on the left and the modeling canvas in the middle.

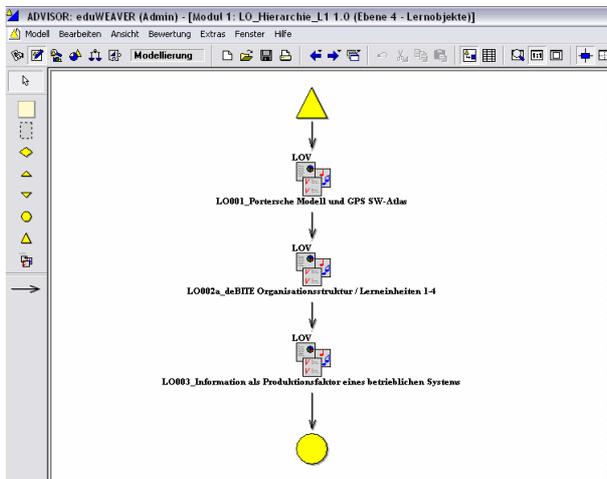


Figure 3: The modeling surface in eduWeaver

From this fourth level of Learning Object Use teachers can directly access the Learning Object Pool, the common repository also provided by eduWeaver.

In order to solve the problems of teachers about finding appropriate multimedia materials and integrate them into their courses, the idea of an open learning object pool has been realized. Learning objects are defined as self-contained, reusable objects, describing one smallest possible, specific part of the topic to be taught. In general a learning object should not exceed the length of 5 – 15 minutes when taught in classical classroom teaching.

Each of the three symbols meaning a learning object in Figure 3 is linked into that Learning Object Pool and the real learning object, meaning an HTML-page, a document, a slide, a video, etc., can be opened by a single mouse click. Within this repository reusable multimedia materials are stored and a graphical overview of all learning objects is given, as shown in Figure 4.

Learning objects graphically presented in the Learning Object Pool (Figure 4), reference to documents of any format, since eduWeaver has no boundaries here, allowing teachers to use and design their contents without any restrictions. The only task to be done by the authors is the meta-indexing of learning objects when publishing them within the pool.

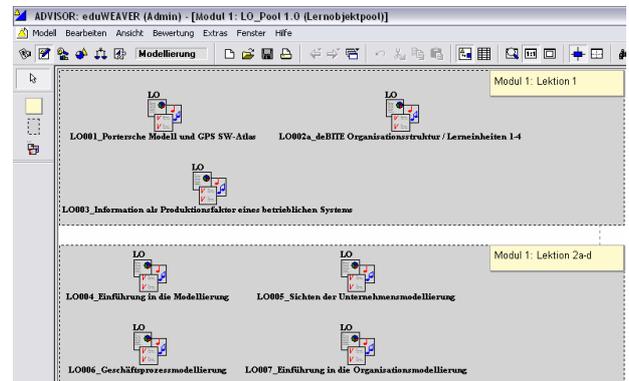


Figure 4: Exemplary graph of the Learning Object Pool

The meta data describing the learning objects correspond to selected parts of the IMS standard [IMS] that allows the content packaging of lessons, modules or even whole courses through the export functionality of eduWeaver. This export functionality adds high value to the basic HTML-generation interface of ADVISOR®, since IMS content packages are of a standardized format that can be imported into any IMS compliant learning management system and provided there easily.

3. eduXX - THE INSTRUCTIONAL DESIGN PLATFORM

Deriving from this development history the whole picture of eduXX can be introduced.

Two main functionalities required by teachers, namely

- the creation of new didactical models for e-learning, in order to realize the new aspects of information and communication technologies within instructional design and
- the management and easy creation of e-learning-compatible teaching materials using their own resources like books, lecture notes and slides,

has been realized through the development of the ADVISOR® meta-modeling platform and the eduWeaver instructional design method.

Figure 5 describes the whole scenario of the Instructional Design Platform eduXX:

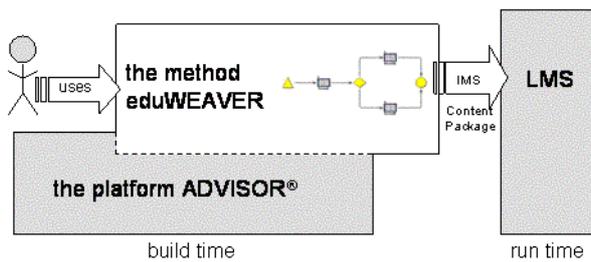


Figure 4: General Architecture of eduXX

According to the Workflow terminology eduXX is divided into two parts, the build time and the run time part.

Within the build time part the graphical modeling of instructional processes, the management and re-usage of (e-)learning objects and the creation of IMS standard based content packages, containing the course structure and the content, is realized.

The run time part is realized by any IMS compliant learning management system that can be fed by the content package from eduXX through the standardized interface. Within this learning management system the execution of the new teaching process with the appropriate teaching materials is realized by using the possibilities of the information and communication technologies.

As stated in the introductory part of this paper, eduXX supports teachers facing technical as well as didactical challenges when employing in e-education.

4. FUTURE OUTLOOK

The development of eduXX has not stopped at this stage, the challenges of new requirements and changing circumstances in the field of e-education keep this project alive and allow the realization of the newest research results. Here some current work on eduXX is introduced as outlook into the short future.

The functionality that supports teachers by simulating and optimizing educational processes regarding times and costs, as introduced in the first part of this paper, is being implemented at the moment. A related research field, business process management, commonly uses typical time (like process cycle-time, latency, etc.) and cost

measures (like labor/personnel cost, etc.) for simulating complex scenarios. [JKBH98] Some of these measures can be used as they are, some measure have to be redesigned for the e-education domain. Typical e-educational simulation results are [BaLi04]:

- Time dimension
 - Learning Cycle Time
 - Teaching Cycle Time
 - Learning Peak Times
- Cost dimension
 - Total Costs for an E-Learning Process
 - Personnel capacity of an E-Learning Process
 - Resource capacity of an E-Learning Process

An other functionality which is being developed now is based on the idea of creating template-based multimedia learning objects based on the existing classroom used resources (e.g. books, lecture notes and slides).

eduXX allows at the current stage of development the easy management and reuse of existing teaching materials, where the emphasis is on the word “existing”. One of the main difficulties teachers face when starting with e-teaching is how to author appropriate multimedia teaching materials when only having books, lecture notes and slides.

eduXX will provide a functionality where based on the existing electronic slides and texts e-learning appropriate HTML-pages for the provision within a learning management system can be created by easy drag-and-drop method. Within eduXX teachers will have the possibility to define an individual HTML-template and then search within the learning object pool for appropriate pictures, texts, videos, animations and to define new multimedia learning object for e-teaching purposes.

These functionalities complete the idea of eduXX of supporting teachers by the easy change of their classical educational methods in order to keep up with newest developments of e-learning.

5. REFERENCES

- [ADV] <http://www.boc-eu.com/advisor/start.html>
- [BaSt03] Bajnai, Judit; Steinberger, Claudia: eduWeaver - the Web-Based Courseware Design Tool, IADIS WWW/Internet 2003 Conference in Portugal
- [BaLi04] Bajnai, Judit; Lischka, Johannes: Simulation for E-Learning Engineering, to appear in the Proceedings of ED-MEDIA 2004, Switzerland
- [BOC] BOC Information Technologies Ltd., <http://www.boc-eu.com>
- [Cis00] Cisco Systems, Inc., Reusable Learning Object Strategy, Definition, Creation Process and Guidelines for Building, Version 3.1, April 22, 2000
- [eduB] The project eduBITE, <http://www.edubite.ac.at>
- [IMS] IMS Content Packaging, <http://www.imsproject.org>
- [JRK01] Junginger, Stefan; Rauch, Tobias; Kühn, Harald: The ADONIS – MQSeries Workflow Coupling – Integrated Design of Business Processes and Executable Workflows, appeared in Proceedings of the 8th European Concurrent Engineering Conference 2001 (ECEC'2001), Valencia, Spain, pp. 111-118
- [JKBH98] Junginger, Stefan; Kühn, Harald; Bartl, Florian; Herbst, Joachim: "Evaluation of financial service organizations with the ADONIS simulation agents", Proceedings of the 10th European Simulation Symposium (ESS 98), 1998
- [KaBa01] Karagiannis, Dimitris; Bajnai, Judit: ADVISOR® An Educational Management Tool, submitted to the Symposium Towards the New Education Society, Zvolen, Slovakia, April 2001
- [StBa03] Steinberger, Claudia; Bajnai, Judit: eduBITE – Educating Business and Information Technologies, E-Learn 2003 Conference in Phoenix, USA
- [Uni] The University of Vienna, Department of Knowledge Engineering, <http://www.dke.univie.ac.at>
- [WebC] The learning management system WebCT, <http://www.webct.com>