

„Wissensraum Architektur“ – A Constructivist Model of Learning for Architectural Education at Anhalt University of Applied Sciences

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Abstract

The study of architecture is by nature highly interdisciplinary. Design, structure, technology, ecology and economics must all be considered in the process of planning and building. Therefore it is important to encourage an integrated approach in terms of education and to create a interdisciplinary network of learning contents. Wissensraum Architektur is a contribution to this idea. Wissensraum Architektur is an internet-based system for teaching and learning at the Department of Architecture and Civil Engineering at Anhalt University of Applied Sciences in Dessau. The basis of Wissensraum is a pool of media elements and multimedia based components to which authors from different fields contribute. The authoring system allows instructors to create, by simple means, digital learning modules. Due to the modular structure, modular elements and sequences in varying relations and by different authors can be reused and restructured. A knowledge map visualizes relationships among the different learning content. In this way, a virtual campus in Dessau is created step by step. The didactical concept of Wissensraum supports Constructivist models of learning. Users can use the database for research and can create their own way of learning concerning particular themes. The availability via Internet makes it possible to work from any location at any time.

1 Structural Design of Wissensraum Architektur

The structural concept of Wissensraum Architektur is orientated on the SCORM¹ model. There are three levels of presentation which differ in complexity of content: media elements, learning cards, and learning units.

1.1 Media Elements

Are the smallest components of Wissensraum, e.g. text, images, interactive applications (Flash-, Java-based), video or audio files. For input, there is an entry-mask containing the necessary options for metadata. Data is stored in high resolution, according to the principle of multi-channel-publishing. All

¹ Sharable Content Object Reference Model

versions that are needed for different presentation requirements, e.g. screen-display in different sizes (thumbnails/ enlargements), printouts, etc., are automatically generated from the original file by the (software) system.

1.2 Learning Cards

Texts, images and animations are composed by an author into learning cards. They are the smallest instructional elements of the system and deal with the topic described in the title. Learning cards can, through „associated media elements“ (images, plans, animation, etc.), which are displayed on the bottom of the card, be further expanded to illustrate the concerned theme. Learning cards consist of a heading with the name of the author, and a toolbar, an info frame and a content-frame. The info-frame shows the specific field and category of the contents that the card belongs to. It also shows all the learning modules containing this card. The history-function makes it possible to easily return to the cards visited before. The entirety of the learning cards makes up a multimedia-based „Architektur LehrLexikon“, which is meant to be an encyclopaedia for teaching architecture. An extensive search function can be used for enquiries. Contents can be stored in a personal folder. The thematic environment of the displayed learning content and its relations to other learning cards are visualized in a knowledge map.

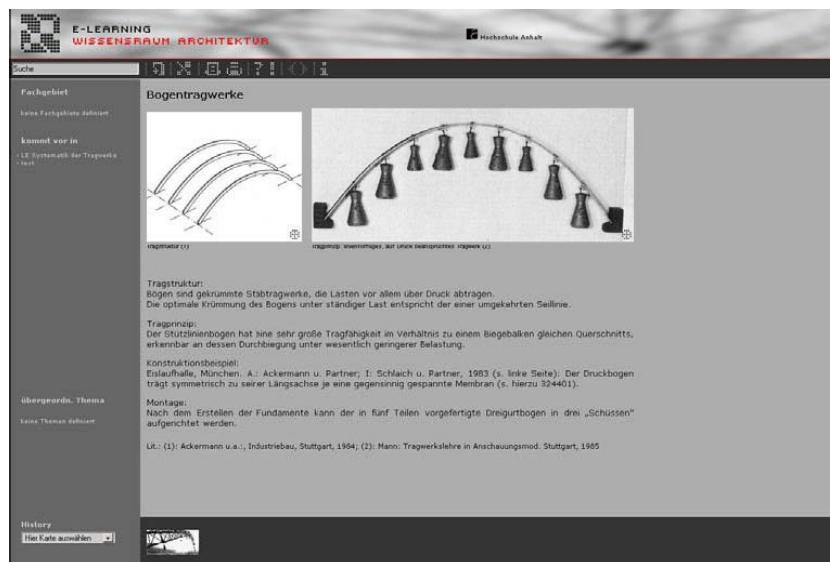


Fig. 1: Learning card “Bogentragwerke” (arch structure) with associated media element

The content of the different learning cards can be exported to Learning Management Systems (learning platforms) in order to create courses. The course administration and management are provided by the learning platform.

1.3 Learning Units

To present extensive topics or to give explanations in greater depth, learning cards can be organized into learning units. The learning units consist of an introductory page which describes the content and intent of the unit, and about 5-10 pages of content. While in many cases simply ordering the cards one after another is inadequate and too general to create a learning unit, the cards are supplemented by related texts through means of the authoring tool which acts as the common thread throughout all relevant texts. Authors have the opportunity to use the essential elements of the cards to bring in what they see as necessary in relation to the topic they want to teach. As there is a fixed general layout, format mismatch among the cards of different authors is avoided. Learners are guided by a navigation bar, which is automatically created by the authoring system. To create learning units, the authoring system provides an editor. The sequence of the cards can be changed at any time, and it is easy to take out or add cards.

1.4 Knowledge Map

Correlations between the related learning cards stored in the database are visualized in a knowledge map. Different icons symbolize general learning content, buildings and persons. In this network, the title of the cards is displayed. The graphic presentation is more descriptive as a textual display and clarifies the relation between content objects. It is possible to select certain aspects of the network by using filters.

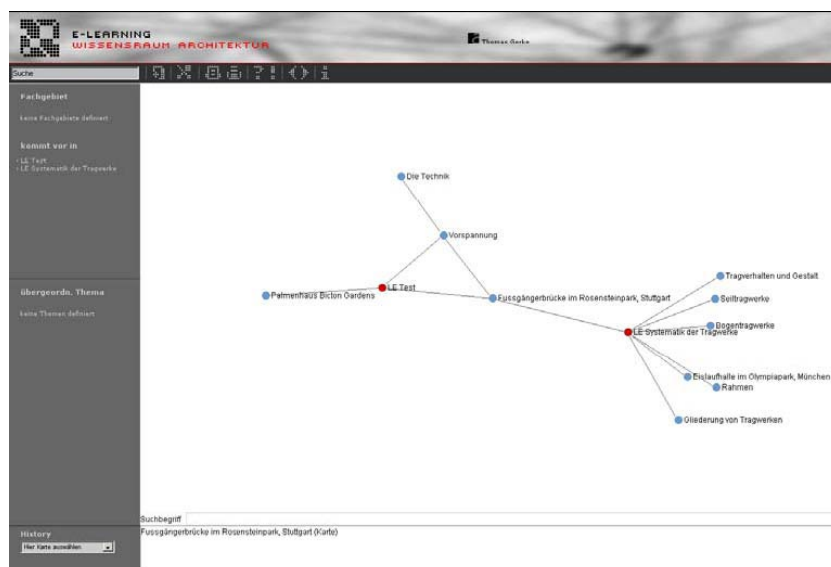


Fig. 2: Knowledge Map

The knowledge map is dynamic and navigable. The current item is displayed in the centre of the screen. By selecting another term, which can also be entered by the search function, the centre of the network moves. A double click on the title opens the contents of the learning card.

2 Technical Realization

2.1 System Architecture

Technically, Wissensraum Architektur is based on a modified content management system² which is divided into an editorial server and a publishing server. The CMS uses open-source software and technologies. The content is drawn up in XML/XHTML and stored in a MySQL-database. The browser-based construction of the system makes it possible to carry out editorial work at any internet-PC without installing special software.

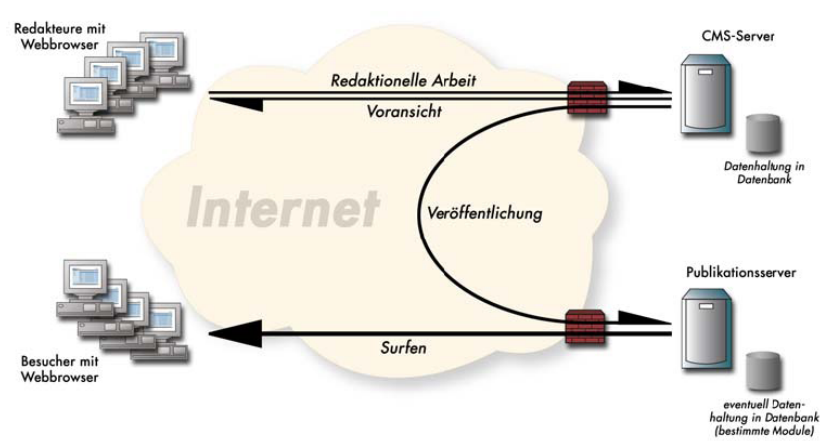


Fig. 3: System architecture of KT-CMS (Source: Klute-Thiemann Informationstechnologie, Dortmund)

When the creation of learning cards and learning units is finished, they have to be published. Data is transferred to the publication server and then provided as html-files.

2.2 Authoring System

The creation of content occurs online. Editorial work can be done via internet independent from place and time. The user interface of the authoring system is aligned to common design of software interfaces, and so is intuitively operable by the user.

² ConMan – Klute – Thiemann Informationstechnologie, Dortmund

For the layout of content, various templates are available. Style sheets are used for formatting, so that there is a strict partition between content and form. For media elements or learning cards, authors can work with their own material or use data from the database. A file structure or a search function is used to find and select these elements.

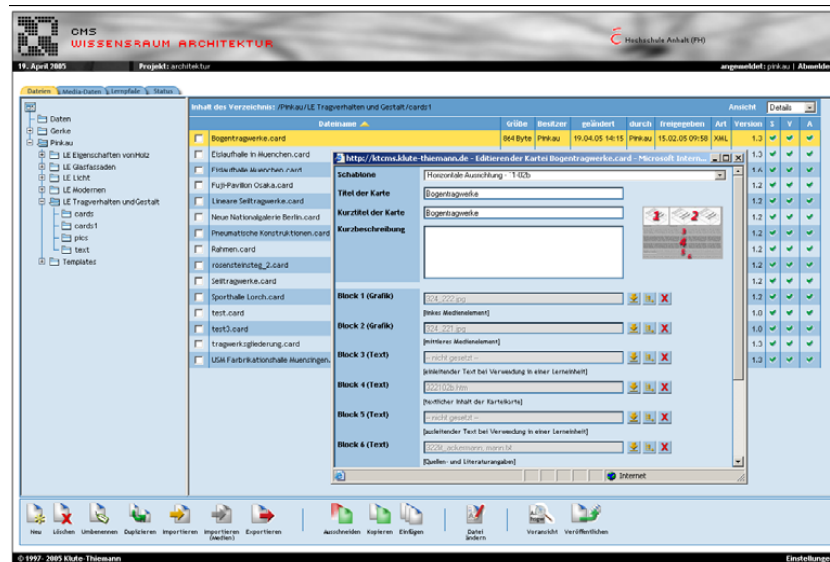


Abb. 4: User-interface of KT-CMS authoring-system, entry-mask for learning cards

The visualisation of the knowledge map is realized by using thinkmap SDK³, a java-based software tool. Correlations between learning cards are determined by an editor.

3 Didactical Concept

Wissensraum Architektur is part of a Constructivist learning model in architectural education. Constructivist learning theory assumes that there is no objective reality. It is rather the learner him/herself, who creates his/her individual construct of reality and thereby generates cognition. The learner is part of the learning process. Especially in the design of a building, this becomes clear: the design process is not linear, but multi-level iterative. The role of the teacher is to be a coach and tutor who shows the way to solve a problem and not an instructor, who asks for answers. Methods of an internet-based design- process by means of a „Digital Sketchbook“ have been developed and evaluated in the IMLAB⁴) research project at Anhalt University of Applied Sciences in recent years. The self-determined approach of learning

³ Thinkmap Inc., New York, U.S.A.

⁴ IMLAB – Interdisziplinäres Modulares Lehrsystem für Architektur und Bauwesen, gefördert vom BMB+F im Programm „Neue Medien in der Bildung“, 2001 - 2003

improves creativity and can be applied to other fields of architectural education. Constructivist learning environments should offer freedom to the user to create his/her own way of learning. The hypertext structure of learning cards and the contribution of different authors makes it possible to develop a differentiated view and to find a personal way of learning. The dynamic structure of the knowledge map stimulates the spirit of discovery and awakens curiosity. Wissensraum Architektur supports an explorative way of learning.

4 Target Group and Applications

Wissensraum Architektur purpose is not only meant to pursue technological goals, but is intended to contribute to sustainable appliance of new media in architectural education. First of all, the project is addressed to the teachers. Local data should be continuously integrated into a central repository of media elements, which can be used by all participating authors. The authoring environment makes it possible to easily create digital learning units. They can be published within Wissensraum Architektur or can be exported to learning platforms in order to create a course. Those learning in Wissensraum can work with the available learning units independent of time constrictions and location. In accordance with the Constructivist approach, they can also use the data base for their own research and self-determined learning. Presently, the project is addressed to teachers and students of the Department of Architecture and Civil Engineering at Anhalt University of Applied Sciences in Dessau. After finishing the test phase, it can be transferred to other departments and schools. Depending on the supplied content, the Wissensraum model can be used for undergraduate education as well as for graduate and post-graduate. Beyond this, the digital content is an important basis for a broad spectrum of e-learning possibilities such as virtual courses or blended-learning arrangements. The website for Wissensraum Architektur is: www.wissensraum-architektur.de

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