

# A Learner-Centered Media Production Process for Web-Based Learning Environments

Huberta Kritzenberger, Michael Herczeg

Institute for Multimedia and Interactive Systems  
University of Luebeck  
Willy-Brandt-Allee 1a  
D-23552 Luebeck  
{kritzenberger, herczeg}@imis.mu-luebeck.de

**Abstract.** The development of web-based courses for virtual universities very often starts from a paper-based tradition of teaching and learning. Web-based learning environments, however, have an added-value by the potential of hypermedia, multimedia, interactivity, cooperation and collaboration, mediated by digital media with different features distinguishing contexts for presentation of content. Currently, there exists no adequate model covering media as distinguishing contextual aspects for web-based learning environments. This paper presents a framework to deal with media features as varying contexts during the development of learning environments.

## 1 Introduction

The production of web-based courses often start from a paper-based tradition of teaching and learning with content authors writing a kind of book, which is subsequently the basis for a continuous media production process considering media features as distinguishing contexts. Therefore, the production of web-based learning material does not only mean the transfer of and adaptation from one medium to another one, but also an integration into an adequate media production process, where media features change contexts for design. As we see the development of web-based courses as equivalent in many aspects to software development processes we refer to ISO 13407 as a reference model for user centered design processes, which focus on understanding user contexts. The importance of contexts have already been recognized in many other areas (see for example Suchman 1987). This paper is based on experience of the authors in the production of web-based courses, in the design of user-adequate learning spaces and in the support of the design process. The IMIS is involved in a national project called "Distance Education in Medical Computer Science" (started in January 1999) which aims at providing a complete course of studies for the specialization of students in medical computer science offered at a virtual university (Hagen, Germany) (Kritzenberger/Hartwig/Herczeg 2001; Kritzenberger/Herczeg 2001).

## 2 Media Contexts in a User-Centered Production Process

The stages of media production (writing a book, transmission of the book into hypertext, hypertext functions, multimedia course, interactive computer-based training, cooperative learning) provide different contexts for thinking about media design for learning environments integrated in one process model of media production (figure 1), covering media features in cyclic sub-processes (similar to the spiral model for the user-centered software development processes as specified in ISO 13407). Furthermore, in the development of web-based courses we have to distinguish several problem areas for the media development process: Domain knowledge selection, teaching model, media features, interactivity, communication and collaboration. Most of the requirements come from the overriding demands of the teaching model. It is the main frame for specification of hypermedia, and has a secondary effect on framing the multimedia use and interactivity. For the pedagogic conception of interaction the main focus has to be on the learner's cognitive operations and information processing procedures. The decision is also the embedding of hypermedia, media use and interactivity in the overall learning environment. These requirements have to be made more concrete in the media design and is subject to discussion between content authors, media designers, pedagogic experts and several other specialists. That is, the case is not to enhance the hypertext with time-based multimedia like audio, video or animations etc.. The critical aspect of multimedia design is to use it for a more precise presentation of facts wherever it seems to be adequate, e.g. as a more concrete way of explaining processes, which otherwise would be too complicated to be explained properly and therefore could otherwise hardly be understood by the learners. For example, simulations can help to demonstrate how time-based actions follow each others in a complex process to be explained in the subject domain. In this stage of development it is helpful to analyze the kinds of knowledge involved in

order to deduce consequences for presentation. Furthermore, there is a larger organizational context of teaching and learning, where communication and collaboration environments are applied. We have also to understand the use of the multimedia and interactive learning environments in this larger context of communication and collaboration processes of the virtual university or other institutions where the web-course will be offered.

Figure 1: Contexts for Media Production Processes

## Conclusions

The model proposed in figure 1 is capable to deal with different media features separately and reflect them as contexts of learning. The model also shows an integration of the interdependence of human-centered design activities as specified in ISO 13407. For further work, this model has to be refined as a generic model for dealing with media contexts in the development of web-based learning environments in order to improve their development process and by this also their usability.

## Acknowledgement

This research is done in the project "Distance Education in Medical Computer Science", which is funded by the German Ministry for Education and Technology in the program "New Media in Education". The code of the research project is 08NM063A.

## References

ISO 13407: International Standard - Human-Centered Design Processes for Interactive Systems (1999E).ISO

Kritzenberger, H.; Hartwig, R.; Herczeg, M.: Scenario-Based Design for Flexible Hypermedia Learning Environments. *Proceedings of ED-MEDIA 2001. International Conference on Educational Multimedia, Hypermedia and Telecommunications* Tampere, Finland 2001 AACE - Association for the Advancement of Computing in Education, pp. 1023-1028

Kritzenberger, H.; Herczeg, M.: Approaches to Quality Management for Developing WBT Courses. *Proceedings of the 20<sup>th</sup> ICDE-World Conference on Open Learning and Distance Education*. Düsseldorf, Germany, 1.-5. April 2001. International Council for Open and Distance Education (ICDE). (Electronic Proceedings)

Suchman, L. (1987): Plans and situated actions. Cambridge University Press