ADAPTIVE LMS AND MOBILE LEARNING

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ABSTRACT
In the WINDS project we have developed the ALE learning management system to support Architecture and Civil Engineering Design Courses. The ALE system integrates the functionality of an e-Learning system with adaptive educational hypermedia on the Web. Our plan is to further develop the system towards mobile learning in the new RAFT project.

KEYWORDS
Adaptive Web Systems, E-Learning, Mobile Learning.

1. INTRODUCTION
The objective of the WINDS (Web-based Intelligent Design and Tutoring System) project is to experiment a comprehensive Virtual University of Architecture and Engineering Design. We have developed an e-Learning environment called ALE integrating an intelligent tutoring system, a computer instruction management system and a set of cooperative tools. Our project partners from European universities have prepared more than 20 on-line courses that should be used by students from autumn 2002. Today there are relatively many web based educational systems available for teachers and students. On the other hand several tools for developing adaptive courseware exist, mainly as academic developments. The objective we try to address developing the ALE system is to integrate the functionality of a complex e-Learning system with adaptive educational hypermedia on the Web. Currently we start a new project called RAFT (Remote Accessible Field Trips) in which we want to support mobile learning and investigate educational benefits of remote field trips in high school settings. Here we outline the current state of the system and some ideas we want to realize to provide certain innovative learning and pedagogical approaches.

2. ADAPTIVE E-LEARNING IN WINDS
We have described the authoring and learning environments of the ALE system in several papers (e.g. Specht 2001, Specht 2002a, Specht 2002b). The ALE system produces individualized courseware for students depending on their current state of knowledge, their preferences and learning styles. The author specifies the metadata according to which various adaptation methods can be implemented, taking into account the user model. In this way, the system can adapt the sequence of content blocks according to the chosen learning strategy. To reduce the cognitive overload of the learners various annotation techniques are implemented. ALE is designed to support different learning strategies and their combinations. Paragraphs contain materials for expository (explanatory) education. Discovery learning is encouraged not only by hyperlinks but also by index terms and their interconnection with learning objects and external documents. Collaboration facilities promote constructivistic learning approaches.

One of the primary objectives of the ALE system is to make the authoring process relatively simple and to support sharing of resources. Several tens of authors test the usability of the system and their comments and suggestions help us to make the system more advanced and reliable. The experience shows that creating study materials of high quality with proper metadata, relationships, index, and library is a very complex
process even for teams of skilled authors. But the potential of the system is high. The created learning objects can be delivered in a variety of ways, from classical web-based training to combinations of classroom events and online seminars, or even as personalized books. Beside the possibility for cross media publishing and the flexible combination of learning objects in individualized curricula the indexing system and the connection of the learning objects allows for personalized coaching of students.

3. MOBILE LEARNING IN RAFT

The RAFT project will support high school students in active, cooperative and sustainable learning combining classroom and on-site research. The main scientific and technological objectives of the RAFT project are to demonstrate the educational benefits and technical feasibility of remote field trips of high school students, to establish extensions on current learning material standards and exchange formats for contextualisation of learning material. This is combined with the embedding of learning and teaching activities in an authentic real world context with real time video conferencing and audio communication to promote new forms of contextualised learner collaboration.

The engineering of the RAFT client devices includes the authoring toolkit for creating contextualized learning materials, the mobile reader client for the replay of contextualized learning materials, the mobile field station for the coordination of several mobile clients, and the extension of the server LMS for managing scheduled live interaction between remote field trip clients and classroom students. The RAFT system will integrate the LMS with customized solutions for contextualised live interaction and video conferencing. The design and implementation of different interface components for interaction with the LMS from PDA, wearable computer and the integration of live video and audio conferencing templates will be the main tasks. Additionally the currently implemented metadata sets should be extended for capturing and handling additional context data about learning objects.

4. CONCLUSION

The current version of the ALE system provides an adaptive learning environment. To support mobile users we plan to enhance the system to take into account additional parameters like computing platform, bandwidth, location, and time to specify the context of the user’s work. The RAFT project will create a new form of contextualised access and indexation of learning materials that will structure learning materials and live collaboration in a more natural and enhanced way. This new form of access and structure of learning materials builds on underlying approaches of situated learning and situated cognition that will have a strong impact on next generation mobile information systems.

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REFERENCES