

Architecture of the Teaching and Learning Environment

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Goals of the T&L Environment Teaching and learning based on multimedia documents can only be done with the help of a computer-supported environment. The teaching and learning environment that we develop in the MMiSS project aims at three major and two minor goals. The major goals are:

- Development: Authors should be supported in the development of course material. Development means the production of new components and the adaption and composition of existing ones.
- Content management: Content management is responsible for persistency and accessibility of the material. It has to treat the versioning and configuration aspects. It manages consistency and the dependencies between the document components. Furthermore, it helps to integrate external components into documents.
- Usage and interaction: The use of the learning material in different kinds of teaching scenarios should be supported. It can only mean the presentation of the material by a teacher. But as said in the overview, we aim at more ambitious support, in particular at an intelligent tutoring environment.

The minor goals are a flexible user management with administration support and the possibility for integrating typical tools for electronic communication.

Architecture To achieve the above goals we have designed an open, web-based architecture that integrates subsystems developed by the different partners. Figure 1 shows the major components of the teaching and learning environment. The core of the system is the *repository* that is responsible for the content management. It manages and visualizes the document components, their versions, relations, and dependencies. It provides a programming interface to access and modify components. *Authoring tools* use this interface to communicate with the repository. They help with the development of the content and semantic integration of new documents into the base of existing material. A naming mechanism is used to link *external components and tools* into courses. Such components can range from simple applets to full-blown theorem provers.

Currently the architecture of the environment provides three different subsystems to present and work with the documents. As simple *presentation platforms*,

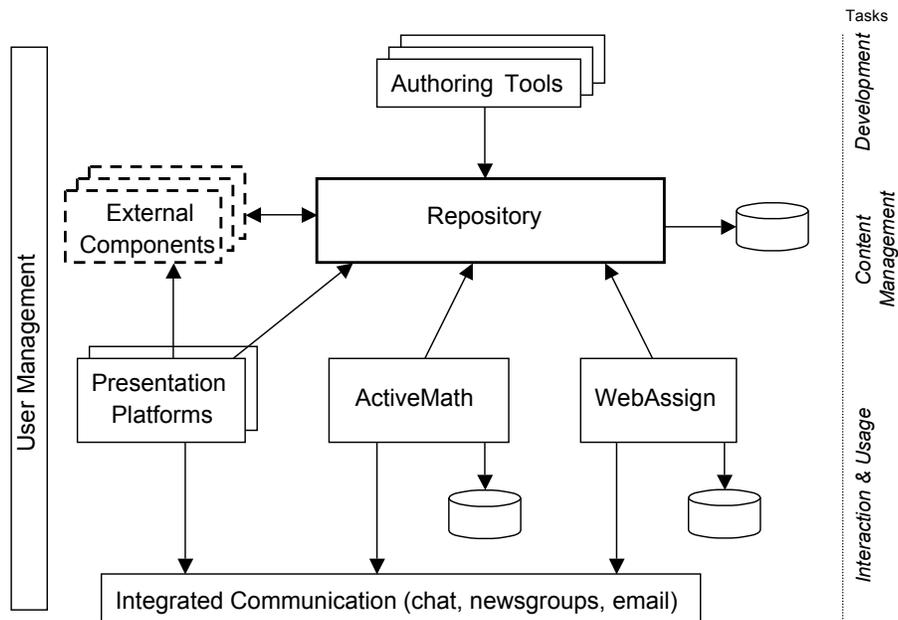


Fig. 1. Architecture of the T&L environment

we use ordinary web-browsers and reader tools. *ActiveMath* is a learning environment for its own. It is being developed mainly at the DFKI in Saarbrücken and partly at the university of Saarbrücken. Its outstanding features are:

- individualized learning in a user-adaptive environment based on a explicit user model,
- active learning by integrating external tools into the work process enabling exploratory learning, pedagogically motivated presentation, and some new proof planning aspects.

The *WebAssign* system developed at the FernUniversität Hagen supports web-based distribution, correction, and administration of course related assignments. Assignments can have interactive parts so that the system gives direct feedback to the student. *WebAssign* also manages the integration of external components that check student answers or provide help in other ways. In addition, *WebAssign* provides a flexible administrative support.

A *user management* component supports a simple user model with different roles and handles the access rights of students, teachers, and authors. The relation between the architectural components and the goals explained at the beginning of this abstract is shown at the right side of the diagram.