Entwurf und Implementierung einer vollständigen Infrastruktur für modulare E-Learning-Inhalte

Michael Bungenstock

Abstract

The entering of e-learning into teaching and education has led to new requirements for IT infrastructures, which cannot be satisfied by present solutions. Many aspects, e.g. learning objects meta data and encoding, are considered in scientific works, but they lack the big picture of implementing a complete system. By ignoring the dependencies and side effects, severe issues arise in practice and lead to proprietary solutions. This evolution is unfavorable for the acceptance of e-learning contents because it causes costs by conversion and refactoring. In this way, the essential advantages of e-learning contents, like the availability, are completely compensated.

This study introduces a complete concept for e-learning contents and a suitable implementation. Other scientific works, which brought important and general knowledge for e-learning contents, are the foundation of this work. They will be combined to a new design and supplemented by new ideas. One essential feature of this new concept is the introduction of the two metaphors "multimedia construction kit" and "brick". These terms support the development of the particular system components and will simplify the usage of the later application. Hence, the metaphors are a helpful instrument to keep the integrity of the whole design.

All designs and the implementation in this study will be done in an object oriented manner usging software engineering methods. A model of activities with e-learning content will be derived from the users' perspective which will be then transferred to a technical design. Low coupling and high cohesion of the several functions will allow a good scalability in different use cases. With the aspired software framework it will be possible to develop single desktop applications as well as distributed solutions. Thus, two applications will be presented for demonstration purposes. The first program is Lyssa, an authoring utility for e-learning contents, and the second one is a repository for central data storage. Both are implemented in the programming language Java.

The design of the framework meets today's standards and is prepared for future evolution. One main objective of this work is the compatibility with foreign systems, in order to gain acceptance. For this purpose, the framework supports several standards and the conversion between the different encodings. An example is the conversion of Dublin Core metadata to IEEE LOM. This compatibility is the precondition for benefiting from e-learning possibilities like reusability and versatility of multimedia contents. Therefore, the framework described in this study is a step forward towards the creation of standard complying systems.