Learning Design Specification for Software Engineering Education

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INTRODUCTION

Learning Design theory is a new attempt to describe the foundational elements of the educational process. Learning Designs have the potential to transform teaching and learning through the sharing and implementation of good practices. Instructors, specifically in Software Engineering Education can benefit from Learning Designs by conceptualizing the educational process via a shared vocabulary for describing learning activities and how they are combined.

Two distinguishing features of recent work are (1) the description of Learning Designs in machine readable formats so that they can be run by software systems, and (2) the ability to store Learning Designs, and hence share them, search for them, re-use them, adapt them and so on and so forth.

THE CURRENT STATE IN ONLINE EDUCATIONAL TECHNOLOGY

In the field of instructional software development, designers and developers lack a common, explicit notation system [Gib03][Wat04]. A notation system is an embedded element of a design language and captures abstract ideas to create transferable designs [Gib05]. Part of the reason why designers and developers use different languages and notation systems, even though they are discussing the same instructional software, is simply that they are interested in different aspects of the product and thus need to describe different features and functionalities [Nel07].

To be successful, Online Education must offer effective and attractive courses to learners, while at the same time provide a pleasant and effective work environment for staff members who have the task to develop course materials, plan the learning processes, provide tutoring, and assess performance. To overcome these deficiencies, the IMS Global Learning Consortium Inc. released the Learning Design Specification in 2003. With Learning Design it is possible to develop and present advanced, interoperable Online Education courses embracing educational role and game playing methods, problem-based learning, learning community approaches, adaptability and peer coaching and assessment methods [Kop05].

UML is one among the technologies specified by OMG as a language to enable model driven approach. OMG in its UML specification version 1.5, [OMG03] mentions that UML offers a standard way to write a system's blueprints including conceptual things. The development of LMS for online education must be based on model driven architecture using UML as the modeling language.

Learning Management Systems (LMS) are specialized Learning Technology Systems based on the state-of-the-art Internet and WWW technologies in order to provide education and training following the open and distance learning paradigm [IEE01a][IEE01b]. The design and implementation of such systems is not an easy task since they are complex systems that incorporate a variety of organizational, administrative, instructional and technological components [Moo96][Car98].

Object-Oriented techniques and UML can be used in modeling and development of an online learning system [Yon03].

LEARNING DESIGN:

Learning design knowledge consists of a series of rules taking the 'if situation, then method' format. These rules are derived from theory, from examples, or from patterns, that offer a high probability that learners will indeed attain the intended learning outcomes.

The new and promising approach is to analyze patterns in collections of comparable best practices, instead of using just one comprehensive example. Patterns reflect the experience of experts in the field, are described concisely and solve recurrent problems in a learning design. Patterns can be created in two ways:

- inductively, by analyzing common structures in a set of learning design methods, or
- deductively, by having meetings with experienced learning designers to identify recurrent problems and generic models for solutions.

FUTURE WORK

UML is a fundamental language in the development of any piece of software. Learning Management Systems in that sense is no different than any other piece of software that can benefit from the use of UML. We have to capture the different LMS activities involved in online Software Engineering education and design them using the UML language to make their implementation easier for developers. Then we must combine all activities to produce a model that summarizes their most relevant aspects.

This unified model can be expressed as a pedagogical pattern and can be used as a guideline for the design of Learning Management Systems.

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