Design and Enactment of Collaboration Scripts – an integrative approach with graphical notations and learning platforms

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Abstract: This paper presents an approach to integrate methods to define collaborations scripts graphically with existing learning platforms enabling the enactment of the scripts automatically in the learning platform. The practical usage of the approach with the MoCoLADe script design tool and the platform CeLS has shown the potential of the approach and provides insights for a generic solution connecting design tools and learning tools.

Background – Computer-enacted collaboration scripts

One of the declared unique advantages of technology for teaching and learning is its potential to support collaborative learning (CL). E-learning Technologies evolved through a number of generations including the following phases: Large scale facilitation and implementation of individual learning process, Learning Management Systems (LMS), facilitation of peers and teacher communications through communications tools. New specifications for Instructional Management Systems based on the concept of Learning Design (IMS-LD) have emerged only recently (Hummel et al., 2004). The IMS-LD engine (CooperCore) and editor (RELOAD) specifies a template that enables creation of synchronized and personalized workflow through a course. An advanced approach for creation, customization and reuse of collaborative sequences of a learning activity flow is addressed by LAMS (Dalziel, 2003). Collaborative sequences may represent strategies that comprise of well-defined structures (scripts), consisting of distinct stages that are interconnected and based on each other in various ways. Scripts structure the collaborative learning process by constraining interactions, defining the sequence of activities and specifying individual roles (Dillenbourg, 2007). The use of scripts in the framework of computer-based learning support environments (LSE) is a major topic of recent research in the CSCL community. The cognitive, computational and educational perspectives of scripting computer supported collaborative learning (CSCL) are elaborated in a recently published book (Fischer et. al., 2007). This poster will describe a model that represents an integrative approach for graphical notations and learning platforms that enable Design and Enactment of complex Collaboration Scripts. The presented integrative approach is based on the existing MoCoLADe - Model for Collaborative Learning Activity Design (Harrer, Malzahn & Hoppe, 2007) and on the Cels Collaborative e-Learning Structures (Ronen et. al, 2006) environments.

Existing work and different perspectives to collaboration scripts

The graphical notation MoCoLADe has been designed for the formal modeling of collaboration scripts based on the conceptual framework of Kobbe et al (2008). The notation provides means to model group formation, assignment of roles and documents to groups or individuals and the definition of temporal dependencies between activities. The dynamic features of the script can be simulated interactively, so that a teacher can check if the script works with her/his class given a specific setup of students, documents etc. The first prototype of the graphical editing tool was tested with several CSCL scripts from the literature to show the soundness of our modeling approach (Harrer, Kobbe & Malzahn, 2007). To allow the execution in existing e-learning platforms, the output of simulation runs and models in the IMS/LD format is possible; a mapping to other learning platforms has been prepared and was goal of the work in this poster.

CeLS is a web-based system designed to create, execute, share and reuse activity structures reflecting various collaborative instructional strategies e.g.: reaching an agreement, peer-product evaluation, contest, jigsaw and any of their combinations. The unique feature in CeLS's design is its ability to use learners' inputs and products from previous stages and to conduct complex, multi-stage, structured activities based different 'social settings'. CeLS is used in conjunction with LMS systems or independently, as a powerful and flexible tool for creating and conducting online collaborative structured activities, and for sharing and reusing these pedagogical resources. CeLS was piloted in Israel by 25 teachers in 50 courses (3000 students) conducted in 6 Universities, 7 Colleges in a variety of subjects including: science, technology, education, medical professions, philosophy, IT and art and in teacher training programs (Kali & Ronen, 2008; Abrahmov & Ronen, 2008).

An integration approach using design tools and learning platforms

Currently, research on and the practice of collaboration scripting is spread over many areas. Besides the empirical research on specific scripts and their effectiveness, there have been initiatives to support a larger
population of educators in the creation of scripts. Some concentrated on dedicated learning platforms, such as LAMS as a self-contained learning platform, some approaches focused in conceptual modeling decoupled of specific platforms. The current lack of integration of different approaches for educational modeling and execution platforms reduces the re-usability of scripts for different settings and platforms.

In this work we aimed at the combination of the two approaches and systems into one interoperable framework to create synergy between these research strands and to reach a wider audience for applying and exploring scripted online learning scenarios. Table 1 describes the different functionalities that can be achieved with each system regards the Modeling and Usage of a pedagogical scripts. Our work aims at integrating these existing approaches for collaborative online learning into a unified frame for designing and enacting online educational scenarios, for practical use in universities and schools in all subject domains.

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<tr>
<th>Approach</th>
<th>MoCoLADe</th>
<th>CeLS</th>
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<tbody>
<tr>
<td>Potential &amp; Affordances</td>
<td>Design of complex collaboration scripts &amp; simulation and testing of the scenarios before the use with students</td>
<td>Design and enactment of complex online collaboration scripts.</td>
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<tr>
<td>Limitations</td>
<td>Does not support enactment of the scripts that have been designed and simulated</td>
<td>Does not provide graphical representation nor simulation and testing of the process before enactment.</td>
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<tr>
<td>Goal</td>
<td>Integrate and combine the potential and affordances to offer: ✓ Graphical and intuitive modeling of collaboration scripts ✓ Simulation and testing by the teachers ✓ Enactment with students of all subject domains and levels</td>
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Using the approach – first results with an example script

The unified approach was preliminary tested by performing a notation planning and enacting of a limited number of pedagogical scenarios. A first exemplary integration was achieved between the graphical models produced by the MoCoLADe editor and the CeLS learning platform. A collaborative activity was designed in the MoCoLADe editor, exported to CeLS and the asynchronous part of the learning scenario was conducted using CeLS (Figure 1).

Figure 1. Graphical MoCoLADe model of the script enacted with CeLS
The scenario in computer science teaching consisted of several activities: a classroom phase introduced a method for object-oriented design with UML (a widespread method for modelling software systems in computer science) using a “group puzzle / jigsaw” approach to learn how to apply the design method. In a second phase the students had to hand in their solutions, exchange them with their peers, and comment on each other’s solutions in the CeLS platform. This circulation of results and the commenting are one of the specific features of CeLS that only few learning platforms support, hence the automated enactment of the peer reviewing phase was possible based on the specification in the script model.

The first small scale design and experiment showed the feasibility of the approach we propose: The initial feedback collected from the teacher as well as the participating pupils indicates that the integration of design tools with learning platforms supports to create meaningful learning activities; we were also able to get confirmation that the prototypical systems are usable by the specific target groups, e.g. the editor for teachers, the platform for pupils and the teacher.

Conclusions and further work
The work presented here proposed an approach for interoperability between design tools for pedagogical scenarios and collaboration scripts and their enactment in various learning platforms. To allow the teachers intuitive access to the educational modeling, graphical notations are well suited (Botturi & Stubbs, 2008). The MoCoLADe language is one representative of these graphical notations and has been used for the definition of a blended learning scenario for a computer science class. The resulting model was exported to the CeLS platform and practically used with a class for the peer commenting / reviewing phase of the script. While this scenario showed the feasibility of our approach, we currently work on a more generic solution that connects modeling tools with learning platforms using a conceptual meta-model that can be mapped from and to arbitrary educational models and learning platforms. With the help of profiles for each platform the tools specified with general properties in the model (e.g. some asynchronous communication tool) can be mapped to concrete tools in the respective platform (e.g. a CeLS comment or a LAMS forum).

References