DESIGN AND EXECUTION OF
DYNAMIC COLLABORATIVE LEARNING
EXPERIENCES

Nicola Capuano

CRMPA - Centre of Research in Pure and Applied Mathematics
DIIMA - University of Salerno

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ncapuano@unisa.it

Problem Statement

• Engaging learners has become one of the most significant problems faced by e-learning developers

• The lack of engagement can be attributed to several issues:
  – Interaction (in many cases the only interaction available is to click on the “next” button to step through the material presented)
  – Challenge (unchallenging learning material fails to stimulate learners, making the experience unattractive and discouraging progression)
  – Empowerment (the learner expects to be in control of the learning experience while in a supportive, collaborative and simulative environment)
  – Social Identity (current e-learning systems tend to isolate learners from their peers inhibiting the learning achieved through social interaction)
**ALICE Objectives**

- To build an innovative adaptive environment for e-learning
- To combine personalization, collaboration and simulation aspects within an affective/emotional based approach
- To contribute to the overcoming of the limitations of current e-learning systems and content

- The proposed environment:
  - will be interactive, challenging and context aware
  - will enable learners’ demand of empowerment, social identity, and authentic learning experience

**Research Themes**

- To do that ALICE will perform research on the following themes:
  - Adaptive e-Learning
  - Simulation and Serious Games
  - Storytelling
  - Affective and Emotional Approaches
  - Collaborative Learning
  - New Forms of Assessment

- From June 2010 to May 2012
- More info on [www.aliceproject.eu](http://www.aliceproject.eu) (under registration)
The Starting Point

- IWT: Intelligent Web Teacher
  - It is a complete e-learning and knowledge management platform
  - It can deliver personalized courses which take into account:
    - learner previous knowledge (allowing each learner to learn only required concepts)
    - learning preferences (allowing each learner to learn through the most feasible learning resources)
  - It is based on the representation of learning domains through ontologies
  - It has a modular architecture that is easily extensible with additional components
  - More info on: www.momanet.it

Research Purpose

- To structure collaborative learning activities
- The collaborative dimension of a learning experience is important to ensure learners engagement and learning efficacy
- The collaboration is often used in informal learning contexts but it is still difficult to be integrated in formal ones
- Free collaboration does not necessarily produce learning
Research Purpose

- **In formal learning:**
  - roles to play, didactic goals to reach and levels of performance to gain are well defined
  - The didactic model determines the design of learning activities

- **In formal learning** a collaboration process must have:
  - a well structured model to adhere to
  - precise and predefined objectives connected with specific learning activities

- We defined a visual language to design and deliver dynamic collaborative learning processes and a tool able to apply such approach

Existing Approaches

- **IMS Learning Design**
  www.imsglobal.org
  - enables the description of any learning process in a formal way, many tools available (e.g. Reload, CopperAuthor, Cosmos, etc.)
  - general purpose, limited in the definition of collaborative learning processes (e.g. it is impossible to define groups or classes)

- **MISA Instructional Engineering Method**
  - graphically describes the instructional design processes and their products
  - general purpose, too complex, few and limited tools available
Existing Approaches

- **Collaborative Learning Flow Patterns**  
  - allow identification and formalization of common practices in collaborative learning  
  - few and limited tools available

- **Collaborative Scripts**  
  - structure collaborative learning by creating roles and mediating interactions while allowing for flexibility in dialogue and activities  
  - lack of standardization in languages for defining scripts

The Theoretical Model

- At an **upper level** a collaborative strategy is seen as a given configuration of learning parameters

<table>
<thead>
<tr>
<th>Learning Parameter</th>
<th>Feasible Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning type</td>
<td>Content and Support; Wrap Around; Integrated; Individual Exploration; Networking Learning</td>
</tr>
<tr>
<td>Orientation</td>
<td>Content and Personalization; Interaction and Collaboration; Cooperation and Project Work</td>
</tr>
<tr>
<td>Type of course contents</td>
<td>Facts; Concepts; Procedures</td>
</tr>
<tr>
<td>Educational goal</td>
<td>Information Storing; Relations Understanding; Application of Simple Skills; Application of General Skills; Interdisciplinary</td>
</tr>
<tr>
<td>Learning Focus</td>
<td>Cognitive Domain; Topic; Problem; Interdisciplinary</td>
</tr>
<tr>
<td>Interactions</td>
<td>Individual; Group</td>
</tr>
</tbody>
</table>
The Theoretical Model

- At a **lower level** a collaborative strategy can be represented through a workflow of didactic activities to be executed:
  - Collaborative Activities (chat, conferencing, wiki)
  - Other Learning Activities (self instruction, assessment, self assessment)
  - Supporting Functions (create a workgroup, branch, join, delay)
- The model can be directly executed or saved as a **pedagogical template** that can be revised and reused in other learning contexts
  - to collect “best practices” in a collaborative learning
  - to promote the achievement of a set of desired learning parameters
  - to reuse the same strategy in different contexts

Some Samples
The Prototype

- The **editing environment** is composed of two main areas
  - a control panel with a list of activities to put into the collaborative process
  - a workspace where activities can be dropped and composed.

The Prototype

- The output of the editing environment is a collaborative learning workflow named Didactic Activities Flow (DAF)
- A DAF can be instantiated by teachers by binding activities with groups, users and resources
- Once instantiated a DAF can be played inside an **execution environment** integrated in IWT
  - An IWT course may become a dynamic component of a DAF
  - A dynamic IWT course may contain a DAF as any other learning resource
Technological Details

- Prototype Components are based on Microsoft Workflow Foundation
- The DAF Editing Environment is a client desktop application based on Microsoft Workflow Designer
- Once defined a flow is compiled through the Microsoft Workflow Compiler and transformed into a DAF
- The DAF Execution Environment is a Web application interoperating with the Microsoft Workflow Engine and with IWT

Experimentation

- A first experimentation of the tool was made to validate both the prototype and the underlying methodology
- It involved about 300 users (teachers and learners) in Mathematics Courses at the Faculty of Engineering of the University of Salerno
- Some informal interviews were made and first results seems encouraging:
  - students found the prototype interesting since they had had the possibility to reinforce theoretical concepts through collaborative activities
  - teachers were able to effectively exploit collaboration activities in forma learning settings, so they felt that the learning quality was ameliorated
Thanks for Your Attention

www.aliceproject.eu