Chapter 19
Bridging the Gap between Instructional Design and Double-Loop Learning

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ABSTRACT

The implementation of double-loop-learning-based educational scenarios in instructional design in workflow-like e-learning systems appears to be showing a gap: whereas the former assumes that processes can be reflected upon and can be modified or amended by the learners, the latter only predefines a limited set of rigid instructional processes. However, an important advantage of instructional designs implemented in workflow-like e-learning systems using modeling standards is the ease with which they can be exchanged with other (educational) institutions. The workflow environment described here aims to make learner reflection and change to instructional processes feasible while maintaining portability. We present a description of the implementation of the educational scenario of the virtual company in our workflow environment that makes use of dynamic workflow processes. Learners are provided with process building blocks, called “atomic actions,” which they can use to create and revise processes on the fly, thus supporting double-loop learning.
INTRODUCTION

The COOPER project (Collaborative Open Environment for Project-Centered Learning) aims to deliver a learning and working environment for virtual teams whose members are geographically dispersed. The members have different backgrounds and competencies, which they use to work and learn together on projects that aim to solve complex, ill-structured problems. We want to achieve this through the use of a standards-based workflow system and an educational scenario that uses double-loop learning extensively.

The COOPER environment is a Web-based working and learning environment that is created with the Webratio computer-aided software-engineering tool that uses standards like the Web markup language and business process modeling notation. The resulting environments like the COOPER environment (including its educational scenarios) can be easily exchanged with other (educational) institutions. The educational scenario we focus on is the virtual-company scenario (Bitter, Sloep, & Jansen, 2003; Westera & Sloep, 1998), which previously has only been implemented using non-workflow-based project support tools, due to lack of support for flexible processes in workflow systems.

An example of an implementation of the virtual-company educational scenario is InCompany Milieuadvies:

InCompany Milieuadvies is a virtual environmental consultancy in which it is attempted to fully integrate learning and working in a distance education environment. This is unlike case-based and problem-based approaches in higher education, where the “working” aspect generally is lacking. In InCompany Milieuadvies we try to generate a networked learning environment that resembles an authentic professional situation.

Students working in InCompany Milieuadvies address real orders on behalf of real external customers, and deliver real products. Therefore the virtual environmental consultancy is not an extended role-playing game, which usually represents self-contained business simulations. (Open Universiteit Nederland, 2006)

InCompany Milieuadvies has been running multiple projects a year since 1997. It is now a required course at the end of the bachelor phase at the School of Science of the Open University of The Netherlands.

The main educational aims of the virtual company are (a) personal professional development through rapid and efficient transfer of acquired knowledge and skills to professional practice, (b) the development of domain knowledge and skills, combined with the social, communicative, and organizational skills required for teamwork, and (c) an explicit and critical reflection on the working and learning processes and a transfer of valuable experiences to organizational memory.

The COOPER collaboration environment described in this article is currently used by these institutions: ALaRI, a master’s programme offered by the Università della Svizzera Italiana; ASP (Alta Scuola Politecnica), a school for young talents founded by Politecnico di Milano and Politecnico di Torino; and CoWare, a leading supplier of electronic design automation software and services.

Like other workflow systems, the COOPER environment is modeled by a designer while users work with the model as it is running. However, to be able to support double-loop learning (Argyris & Schön, 1996), we introduce the novel concept of “atomic actions.” Atomic actions are small independent process building blocks students can use to build, modify, or rearrange work processes while the system is running.