Chapter 8

Visualizing Learning Processes Using Didactic Process Maps

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ABSTRACT

In this chapter the visualization tool “Didactic Process Map” (DPM) is presented to discuss and visualize the solution part of pedagogical patterns and collaborative learning processes. Such an instrument has to be easy to learn, easy to use, and must be able to visualize the essential aspects of patterns and of learning settings. Completeness and formal validity are not required because DPM is supposed to be used by people discussing with each other (human interaction) and does not need to be processable by computers. The target audiences of DPM are teachers, practitioners and learners. As their focus does not lie on describing learning processes, DPM has to be as simple as possible.

In order to keep DPM as simple and easy to use as possible an approach following the 80:20-principle (pareto-principle) has been chosen: essential properties of the pattern and the learning processes must be visualizable while unessential and rare used properties have to be left out. They can be communicated literally and negotiated orally. With this principle in mind, the DPM approach distinguishes itself from existing efforts for an exhaustive learning process description language and fits well into the design pattern approach.

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PEDAGOGICAL PATTERNS

Origin and Definition of Patterns

The architect Christopher Alexander was the first to bring up the idea of design patterns (Alexander 1977): “Each pattern describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice.” Alexander’s idea has been picked up by Gamma et al. (1995) who wrote the seminal book ‘Design Patterns’, containing over twenty design patterns for object oriented programming. Nowadays patterns are used as a widely spread documentation method in the field of information technology, human-computer interaction (Borchers, 2001), pedagogy, computer supported collaborative learning and others. According to Alexander’s ideas, Kohls (2007) pointed out patterns as descriptions of problems and their solutions. Each pattern has to include at least the following elements: name, problem, context, forces and a solution.

Documentation of Learning Processes

Dessus and Schneider (2006) describe the objective of educational modeling languages (EMLs) as follows: EMLs intend to define pedagogical scenarios, exchange learning units, execute a unit in a learning platform and sketch, design, plan and discuss pedagogical scenarios. EMLs reflect a change in emphasis away from using the computer to deliver educational content towards using the computer to facilitate the teaching-learning processes (Rawlings et al., 2002).

Ron Koper, the inventor of EML (which later evolved to IMS-LD), lists the following reasons for notational methods to describe learning environments (Koper, 2000):

- **Collaboration enhances professionalism:** “Different experts can work together on educational design and development. [...] This leads to education that is more professionally designed.”
- **Medium-neutrality enhances flexibility in the development phase:** “In the development process there is not yet a need to consider the distribution medium, since the notational system is medium neutral.”
- **Technology-neutrality enhances future-proofness:** “The notational system makes investments in educational development future-proof, because it is immune to ICT innovations.”
- **Exchange of units enhances reusability:** “The notational system makes it possible to exchange units of study or parts of units of study among institutions, within institutions and among suppliers. Reuse of materials and designs are optimally supported by doing so, which greatly increases the efficiency of the development process.”
- **Explicit notation enhances possibilities for quality management:** “Explicit notation of the design gives a better handle on quality.”
- **Standardized notation eases research:** “The uniform manner of recording provides a research instrument with which the structures and patterns of specific instructional models can be further investigated and related to their effectiveness. Results of the research can be described in the notational system as unambiguous examples.”

According to McAndrew (2005), design patterns are a useful way of sharing experience in the field of educational design:

‘The use of patterns, then, can be seen as a way of bridging between theory, empirical evidence and experience (on the one hand) and the practical problems of design. The intent of pedagogical patterns is to capture the essence of the practice in
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