

# Chapter XII

## Enabling Learning on Demand in Semantic Work Environments: The Learning in Process Approach

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### INTRODUCTION

The new flexibility of workers and work environments makes traditional conceptions of training in advance, in rather large units and separate from work activities, more and more obsolete. It is not only the problem of inert knowledge (i.e., knowledge that can be reproduced, but not applied; Bereiter & Scardamalia, 1985), but also the degree of individualization of learning paths these traditional methods cannot cope with. What we actually need is learning on demand, embedded into work processes, responding to both requirements from the work situation and from employee interests, a form of learning crossing boundaries of e-learning, knowledge management, and performance support (Schmidt, 2005). Many see self-steered learning as the salvation for that new paradigm (in contrast to course-steered learning activities), but this ignores the fact that guidance is essential—both for the learner (reducing the cognitive load) and for the company (enabling the manageability of learning processes). As

a consequence, we have elaborated a concept in between: context-steered learning in which learners get contextualized recommendations of learning opportunities.

Implementing such a method requires a semantic work environment infrastructure that allows computer systems for getting hold of work situations and the learning needs arising out of them. Especially crucial is a semantic model of human resource development in such a setting just at the right level of complexity (not simplifying too much, but still manageable), a set of services and a user context management component for capturing and maintaining the information about what the user is currently doing and what's her state.

### BACKGROUND AND STATE OF THE ART

The idea of a learning on demand at the workplace has been very popular for the last 3 years.

However, this has not resulted in a well-defined (research) community for investigating the means to support it, but is rather scattered among various disciplines. There is not even an agreed term for this form of learning. Terms range from “embedded learning” (Straub, 2005), via “work-integrated learning” (Lindstaedt, 2006) up to “workflow learning” (Cross & O’Driscoll, 2005).

In our research, we coined the term “context-aware workplace learning support” (Schmidt & Braun, 2006) to denote any automated means of learning supported which are based on the situation of the user in her work processes. It builds upon experiences and results in many different fields among which the most important ones shall be summarized in the following:

- **Business-process-oriented knowledge management (BPOKM, e.g., Abecker, 2004):** BPOKM has realized the importance of the process context for context-aware delivery and storage of knowledge assets. Recently, the approach was further developed towards informal learning techniques, for example, in Farmer (2004). While it is true that business processes are an important element of the work context, they definitely are too narrow, although there are some approaches extending it like Hädrich and Priebe (2005). Furthermore, BPOKM has so far ignored the concept of pedagogical guidance completely, viewing the problem mainly as a retrieval problem of the right content.
- **Just-in-Time Information Retrieval:** The approach is similar to BPOKM with the difference that it does not particularly focus on business situations, but rather on a general task context (Rhodes & Maes, 2002). By its generic nature, it allows only for a shallow consideration of context, usually only keyword-based query generation.
- **Macroadaptive e-learning approaches:** like Woelk and Agarwal (2002) or Davis et al. (2005) mainly adapt to the learner in terms of delivery. They filter the learning content based on the learner’s competencies and the knowledge requirements of the current position or business process context. While this is an important step into the direction of context-aware learning support, they only consider rather static elements of the context, which does not allow for deeper integration of working and learning processes. Interesting developments are in the direction of context-aware recommendations like in Lemire, Boley, McGrath, and Ball (2005), but they have still a notion of context too limited for holistic workplace learning support.
- **Microadaptive e-learning approaches:** and adaptive hypermedia approaches are probably the area of research with the longest history and highest activity (Brusilovsky, 2001; Park & Lee, 2004). They focus primarily on the learning object behavior itself and how to adapt it to the learner and her characteristics. Recent approaches include capturing the learner’s context with the help of eye-tracking (Gütl et al., 2005). The main problem of current adaptive e-learning approaches is that they do not consider learning in a work context, but rather set up artificial contexts in learning labs. They allow for a deep contextualization on the personal level, but neglect the organizational context completely.
- **Intelligent tutoring systems (ITS):** rely on AI techniques to provide complex adaptive behaviour. These systems have mostly focused on supporting and scaffolding of problem solving in learning (Brooks et al., 2006). In contrast to the microadaptive approaches in the previous paragraph, their adaptive behaviour is based on rich knowledge representations, and they use cognitive diagnosis and user modelling techniques to respond to the needs of the learners. The key

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