Chapter XI
Applying Blended Learning in an Industrial Context: An Experience Report

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ABSTRACT

With the rapid rate of innovation in software engineering, teaching and learning of new technologies have become challenging issues. The provision of appropriate education is a key prerequisite for benefiting from new technologies. Experience shows that typical classroom education is not as effective and efficient as it could be. E-learning approaches seem to be a promising solution but e-learning holds problems such as a lack of social communication or loose control on learning progress. This chapter describes a blended learning approach that mixes traditional classroom education with e-learning and that makes use of tightly integrated coaching activities. The concrete effects and enabling factors of this approach are discussed by means of an industrial case study. The results of the study indicate that following a blended learning approach has a positive impact on learning time, effectiveness and sustainability.

INTRODUCTION

Today, software systems are available for almost all aspects of human life, ranging from household appliances to transportation/logistics, communication and health. Although, this is good with respect to effort and costs, at the same time it increases the need for high quality systems. But, the development of high-quality software systems requires well-trained professionals using

sophisticated tools and techniques. Unfortunately, transferring new techniques and tools from research into industrial practice is not easy. It may take years for a new, promising and even proven idea to become accepted as standard industrial practice. Software developers and organizations are regularly faced with technology decisions concerning the adoption of technology. Thus, technology adaptation and introduction requires adequate training (Lutz 2007), especially concerning development methodology and quality management.

Typically, the demand for training is based on the job- and activity profile of employees (i.e., developers are trained in technologies they are going to apply in their projects) or on the requirements of the applied curricula. Building a training program on the actual needs and requirements of its participants is a step into the right direction, since this overcomes the problems typically associated with static training programs concerning flexibility, timeliness, etc. (Singh 2003). However, even the most flexible training program (wrt. content) is of limited value if its transfer methodology (i.e., how the training should be performed) is not adapted in a way that ensures maximum sustainability.

According to (Wills 2006), "traditional" strategies, using classrooms and technology and topic experts (e.g., professionals or professors) are in broad use. Unfortunately, these strategies are not only cost- but also time-intensive. While this might be acceptable in a university context, companies, especially small and medium-sized enterprises that have tight development schedules and short software release rates, cannot afford such trainings. Developers participating in traditional training programs are not able to develop software at the same time (i.e., reduction of development time). E-learning has been advertised as one solution for this problem by allowing and actively supporting education at any time and at any place.

E-learning, which requires initial investments for preparing training media, is not "cheap". Companies offering such training activities therefore have to acquire a large audience in order to obtain a positive return on investment (Ochs & Pfahl 2002). However, a large audience bears the danger of generalization (i.e., the training material is not adapted towards the specific situation of its participants) and lacks in social communication (i.e., learning in isolation) (Stark & Schmidt 2002). Communication problems might be mitigated by providing online support, guidance, and discussion facilities, although these require extra resources and effort and thus, increase the need for an even larger audience. Another problem associated with large audiences is the varying level of experience and background knowledge of its participants (i.e., heterogeneity) (Bunse, Grützner, Peper & Steinbach-Nordmann 2005). Thus, cost efficiency and large audiences are like chasing one's own tail.

Traditional and e-learning both have their strengths and weaknesses. Combining them in so- called blended learning arrangements may outweigh the negative effects of both approaches, conserve the positive effects, and may even add additional value. Based on practical observations and experience with both "traditional" and e-learning, we propose a blended learning approach (Bunse, Grützner, Peper & Steinbach-Nordmann 2005) that mixes traditional classes and e-learning: E-learning is used to leverage knowledge and skills in the very beginning, followed by in-depth seminars for teaching advanced concepts as well as for performing group work, and practical exercises.

One important goal for developing and applying our approach has been the assurance of sustainable learning effects (Asian Development Bank 1997). In other areas of education and training (e.g., soft skills), coaching is an often used means for addressing this problem. Coaching is a technique for observing the current functioning, assessing the strengths and weaknesses, and developing measures for addressing needed changes. Transferred to the domain of technology educa-