

Chapter 20

Designing Contextualized Interaction for Learning

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ABSTRACT

In the following chapter, an overview is given over the experiences and design decisions made in the European project RAFT for enabling live distributed collaboration between learners in the field and in the classroom. Beside a context analysis for defining requirements for service needed as an underlying infrastructure user interface design decisions were essential in the project. As a flexible and powerful approach a widget based design for the user interface enable the project to build clients for a variety of hardware and devices in the learning environment ranging from mobile phones, PDAs, tablet PCs, desktop computers, to electronic whiteboard solutions. Enabling consistent and synchronized access to information streams in such a distributed learning environment can be seen one essential insight of the described research.

INTRODUCTION

In the last years the Web 2.0 developments also had an important impact on the e-learning 2.0 approaches and new forms of modular and personal learning environments. These personal learning environments integrate and make use of a variety

of learning services and “mash up” those services in individual instantiations of learning environments. Additionally also the field of mobile and ubiquitous computing has established a variety of solutions and best practices bringing e-learning support to the nomadic user. The nomadic user has special requirements and as the user/learner

accesses learning support in a variety of context these requirements change. This basically holds both for single users accessing technology and information from different learning contexts as also for collaborative systems that enable distributed learning. As a classical setup for such distributed access to a learning environment we would like to highlight systems for supporting remote collaboration between mobile and classroom settings. The European project RAFT was a project exploring this field for about three years and a lot of lessons have been learned from this project as also empirical studies have demonstrated the effects of well-designed flexible environments supporting such distributed collaboration for learning.

On the one hand these developments describe a trend towards decomposition from highly complex and integrated monolithic learning management systems towards frameworks that enable the dynamic composition of personal learning environments out of a wide range of services and open source systems providing high level functional service interfaces for easy integration (Web-services, APIs). On the other hand the mobility trends and the usability requirements of mobile devices and mobile information access clearly highlight the split of complex e-learning environments into focused small applications of pieces of functionality designed for the context of use referred as widgets or appliances.

This chapter will describe and analyze developments coming from the e-learning 2.0 environments that are composed of Web-services and integrate those services based on flexible and customizable user interfaces that can consume and easily provide personal learning environments. Furthermore the next challenge ahead for making use of such environments is the distribution of such systems between different client systems that can be used mobile, on the desktop, electronic whiteboards, or in embedded displays and interaction devices.

First we will describe the contextual analysis for developing a service portfolio based on a

functional specification and a clustering of such functions. The services were also further defined by a description of service orchestration and how the base services have to be combined for higher level use cases and instructional designs.

Second in a mapping between pedagogical roles, the underlying instructional designs, and a variety of mobile, desktop, and whiteboard clients, contextualized user interfaces consisting of widget combinations and customizations were developed based on the described service infrastructure in the European RAFT project.

We will describe developments and design approaches for mobile and contextualized learning support systems and how these systems support nomadic users and the access to functionality from a variety of user interfaces via flexible and dynamically configurable widget frameworks and the underlying service infrastructure.

BACKGROUND AND RELATED WORK

Situated learning as introduced by Lave and Wenger (Wenger & Lave, 1991) states the importance of knowledge acquisition in a cultural context and the integration in a community of practice. Learning in this sense must not only be planned structured by a curriculum but also by the tasks and learning situations and the interaction with the social environment of the learner. This is often contrasted with the classroom-based learning where most knowledge is out of context and presented de-contextualized. On the one hand the process of contextualization and de-contextualization might be important for abstraction and generalization of knowledge on the other hand in the sense of cognitive apprenticeship (Collins, Brown, & Newman, 1989) it is reasonable to guide the learner towards appropriate levels and context of knowledge coming from an authentic learning situation. Contextualized and mobile learning combine the latest developments in ubiquitous

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