Chapter VIII
Constructing Mobile Technology-Enabled Environments for an Integrated Learning Approach

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ABSTRACT

This chapter presents a review of the approach, design and implementation of the networked educational infrastructure of the ENLACE project that supports ubiquitous learning processes. The design phase in ENLACE was conceived based on a Learning Object Repository and the learning tools are presented as well as the approach for integrating these tools into the networking infrastructure. Considerations about the evaluation and the evolution of the system are also discussed.
INTRODUCTION

Mobile technologies have demonstrated the potential to enrich learning experiences outside the classroom (Faux, McFarlane, Roche, & Facer, 2006; Soloway et al., 1999), blurring the boundary between formal and informal learning (Scanlon, Jones & Waycott, 2005) and shifting the best learning opportunities from teacher-centered practices. Most of the work so far has focused on instruments and handhelds used for data collection and multimedia information access, while visiting museums and field settings (Soloway et al., 2001). Moreover, the trend of handhelds as student personal devices has opened new possibilities of supporting synchronization and interactivity for a variety of collaborative classroom activities (Tatar, Roschelle, Vahey, & Penuel, 2003). However, the provision of technology to support learning in different spaces, still remains as a range of unintegrated options, and typically there is not computational support for a seamless workflow of activities where data, content, and artifacts could be shared and reused by long-term learning processes, either by the students, teachers, or other contributing peers in a learning community.

In the ENLACE Project we are exploring the design and implementation of a technological infrastructure as an educational networking platform offering services that will provide ubiquitous Web applications for learning activities both inside and outside the classroom in order to improve student learning and teachers’ work (Verdejo, Celorrio, Lorenzo & Sastre, 2006a). A guiding principle in our approach is to imbue the technology design with a set of rich scenarios grounded on current learning sciences research on socio-constructivist learning, that is, learning is considered both a social and a cognitive activity (Koschmann, 1996). We are designing, with teachers and experts, technology-enabled scenarios providing facilities to foster experiential and constructive learning activities, meaningfully related to different subjects in the curriculum, where the study of a problem is considered through different facets and methods.

In our vision students are engaged both in individual and collaborative activities that promote their curiosity by inquiring about open questions (Branch, & Oberg, 2004), directly exploring and observing their environment, compiling information, analyzing and representing data, building models to explain and predict behavior, exchanging and discussing their findings, linking their views with real problems faced by professionals, and opening and contributing to create a shared memory with personal traces in a learning community. For example, a middle school teacher proposes a question to their students: “Why does this bird live in this place/habitat in the spring and summer time?” This question acts as the thread for a series of activities in differently localized scenarios, including a field trip to a nature park to experience and identify that particular habitat, and raises topics not only related to the natural science subjects (flora, fauna, habitat, and climate), but also to music (motivated by the need to identify the sounds of the birds), to geography (topographic and relief maps) and to mathematics (to calculate and represent distances using different measures). This also motivates teachers to coordinate themselves and integrate their respective agenda into a larger perspective.

The learning workflow includes activities for a long term period (to be carried out either in sequence, parallel, or overlapping in time) in different scenarios (classroom, home, computer lab, field trips, and exploratorium). The activities involve teachers and learners belonging to a school and wildlife monitors from an association. The educational network enables the collection of data in a site of interest, supporting its recording and reuse later on. The purpose is to facilitate the articulation of physical exploration of a site of special interest, with analytical reflection in the school. In order to permit a smooth flow throughout the scenarios of activities, the technological
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