Chapter 13
Schools in Action: Pedagogical Evaluation of COLLAGE, a Case Study on Mobile and Location Game-Based Learning

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ABSTRACT
This chapter looks at the implementation and evaluation of mobile learning scenarios with location-based features, done under the project COLLAGE (Collaborative Learning Platform Using Game-like Enhancements). Five scenarios are examined. Evaluating different implementations within the same project gives an appraisal of the technical and pedagogical value of the mobile learning scenarios, but also informs the research community of appropriate evaluation models and evaluation parameters, which are lacking in the game-based mobile learning with location-based components. The project responds to questions about designing mobile learning scenarios that are pedagogically sound and attractive to secondary school students, and presents the pedagogical evaluation of the effectiveness of mobile game-based learning scenarios in the COLLAGE platform. The project makes a case for a close collaboration with teachers and students in elaborating and validating complex mobile learning scenarios.

INTRODUCTION
This chapter looks at the implementation and evaluation of five mobile learning scenarios with location-based features. We had the following research and development questions:

- What are the approaches to design learning scenarios to be implemented in a mobile
learning platform that are pedagogically sound and attractive to secondary school students?

- What should be the procedures for designing games for mobile-learning location-based scenarios? What evaluation procedures and parameters are best for evaluating mobile learning?

We approached these issues through a series of cases developed in the frame of the project COLLAGE (Collaborative Learning Platform Using Game-like Enhancements). COLLAGE was a 2-year project funded by the European Commission, eLearning Programme, focused on secondary education as the students are more familiar with the use of the mobile technology and game-like applications. This Chapter can be considered the continuation of "Developing tools that support effective Mobile and Game Based Learning: The COLLAGE Platform", a chapter of this book.

There are only a few examples of mobile learning applications devoted to secondary education which have been extensively evaluated in real learning settings. There is still not enough accumulated experience on using mobile learning, and most of the examples refer to informal education and to higher education projects. Evaluating different implementations within the same project, not only gave us an appraisal of the technical and pedagogical value of these mobile learning scenarios, but also informed the research community of appropriate evaluation models and evaluation parameters, which are lacking in the game-based mobile learning and location-based learning area.

In addition, sound pedagogical principles for designing mobile learning scenarios were explored for the enabling technologies and learning platforms. The complexity of the design increases because the learning strategies include games as an added motivating aspect, and outdoors location-based scenarios are part of the learning context. Furthermore, best practice principles have been consulted to inform the design and specially, the operationalisation of the implementation of the scenarios, the novelty of the approach in secondary education, and the complexity of the technologies all added an extra difficulty to put into practice these rich scenarios in real learning situations. The complex panorama was completed by the fact that the users, teachers and students were included in the process from the very beginning.

Usage scenarios in COLLAGE have been developed combining several pedagogical approaches within the constructivism pedagogical theory where the individual learner constructs knowledge based on his/her pre-existing and current experiences. The learning environment build throughout the project resembles computer games for children, facilitating pupils’ interaction and acquisition of new knowledge. On the other hand, the situated learning approach suggests the acquisition of knowledge through social participation and collaboration. In COLLAGE scenarios students and teachers confront problems together in authentic learning situations.

The aim of this chapter is twofold: first, to present the COLLAGE learning scenarios and learning games; second, to discuss the pedagogical evaluation results of these learning scenarios implemented in the COLLAGE platform.

Five scenarios are presented with descriptions of the learning activities and the technologies used, which illustrates the unique nature of COLLAGE in the field of mobile learning. Each scenario has unique features, showing variety and richness. The five scenarios presented are:

- **Carnuntum**: archaeological site in the outskirts of Vienna, Austria. COLLAGE created a role-play game with different learning "paths", in which students follow a character representing an inhabitant of the city. They have to answer questions at certain places and fulfil tasks (e.g. take a picture of this location) on a PDA.
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