Chapter 15

M-Learning in the Field:
A Mobile Geospatial Wiki as an Example for Geo-Tagging in Civil Engineering Education

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ABSTRACT

In subjects such as Civil Engineering, Architecture, Geology etc., education is mostly based on visual information. For example, in Civil Engineering every building can be seen as a unique object at a certain location. During the education of Civil Engineers many field based studies and excursions take place, however, not only the images but also geographical coordinates are essential. Wikis have been in use for collaborative learning for more than ten years. Mobile phones provide access to them from nearly everywhere. The availability of those technologies has led to rapid advances in the area of m-Learning and the possibility to apply challenging constructive educational concepts. Consequently, in this paper we describe the user centered design, development and evaluation of a combination of these technologies to support collaborative learning in the field: A Wiki-based mobile geospatial information system, the so-called TUGeoWiki. The primary objective of this geowiki is to provide a user-friendly tool for mobile collaborative learning for all areas where geo-tagged information could be useful. Moreover, TUGeoWiki was developed in order to provide the integration of external map material via

map APIs including information such as that delivered by Google Maps. Subsequently, it is possible to provide both highly detailed maps and satellite images without having the need to license such material. Furthermore, the user interfaces used by such tools is well established, due to the increasing number of mapping related mashups. The evaluation during an extensive field test within a large civil engineering excursion to various large-scale construction sites in Austria demonstrated that collaborative learning can be successfully supported by the application of TUGeoWiki.

GEOTAGGING AND CIVIL ENGINEERING

In subjects such as Civil Engineering, Architecture, Geology etc. education is mostly based on visual information. According to Brohn "the language of intuition is visual, just as the language of analysis is abstract and symbolic" (Brohn, 1983). This is especially true in the field of Civil Engineering where sketches and drawings are highly necessary, because there is a strong relationship between nature and mathematical models (Ebner, Scerbakov, & Maurer, 2006). Learning by studying existing load bearing models is essential for becoming a good engineer. Further, it must be pointed out that every building can be seen as a unique object at a precise location. So on-site excursions and field studies are common and are used to give learners more practical examples on how real-life situations look. One of the most difficult tasks is to find an appropriate physical relationship to describe an engineering model, because of the complex coherences. To represent nature with a simple and calculable structure is the first job of a structural engineer. However, all these arguments should show why visualizations are absolutely necessary for this work and are the basis for further work. But not only images help to plan and understand buildings, also geographical information is of interest:

- Where is a building located geographically?
- Which types of buildings are especially predominant in certain areas?

- In the case of large projects (streets, tunnels, hydraulic structures) where are the different contract sections?

Needless to say, that there are many more questions, which can be answered by providing global coordinates. From a technical perspective it must be pointed out, that nowadays mobile phones, such as the Nokia N95, with GPS modules on board, make it easy to add coordinates automatically to pictures. Access to the World Wide Web is available, in some shape or form, from nearly everywhere in Austria.

In this paper we would like to address the research question on how the learning behavior of structural engineering students can be enhanced by geotagged real-life, on-site, pictures. The main idea is that students, as well as lecturers, should take geotagged pictures with them during their field studies or excursions and upload them to a Wiki system in order to write collaborative articles about these pictures. Upon upload, the appropriate Google Maps section is automatically added to show the place on different maps. The questions that we would like to answer in the first phase are: How comfortable is the use of mobile phones in combination with GPS for lecturers on-site? How should the application look to allow user-centered collaborative work? How can global coordinates enhance the daily learning process of students?

This paper mainly concentrates on the implemented Wiki system and describes it from a technical point of view. Then, a preliminary field study is presented to show the general idea. Finally,

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