"Open Street Map" as a Problem Based Learning Project: Opportunities to Use and Contribute to the Free Map of the World

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Abstract: The paper describes how problem-based learning has been successfully applied in the context of an IT seminar evaluating the opportunities of OSM. Students have been split up into 2 groups, one of them dealing with the use of OSM in different aspects and the other group focussing on the task of contributing to the OSM project. The workflow of the 7 steps according to the PBL method is described and illustrated with material from the course. Applying this method lead to a more student driven learning process, stimulating a more enduring way of acquainting knowledge.

Keywords: OSM, Open Street Map, PBL, problem based learning

1 Introduction

The open community project "Open Street Map" (OSM), founded in 2004 has gained in importance as a great source for freely usable spatial data. By 2013 more that 1.5 million users were registered, by 2017 the number increased to more than 4 million.

Already in 2012, the city of Munich became an official member of the OSM community and published the city plan on "www.muenchen.de" based on OSM data.

Meanwhile, numerous services and applications on the web are based on OSM data (https://wiki.openstreetmap. org/wiki/List_of_OSM-based_services). Even in commercial GIS solutions, the access to OSM data as a basic cartography has become common use.

For the context of environmental and landscape planning DRANGUSCH et al. (2012) have evaluated the potential of OSM as a valid data source in comparison with official data, provided by governmental agencies. They came to the conclusion that OSM is comparable in terms of depth of information and validity with the "official" reference data provided by the ordnance survey.

For students in the "International Master of Landscape Architecture", coming from more than 40 countries around the world, it is part of the curriculum to be involved with OSM for several years now.

In the early time, after a short introduction to the topic, small groups of students got tasks dealing with partial aspects. Having done their research, they had to present the results in a plenary session. Essentially, prepared by the lecturers, the didactic approach at that time was more or less teacher driven.

Inspired by a project group on new didactical approaches, the idea was born to experiment with Problem Based Learning (PBL), facing the students with OSM in a workshop context.

The principal idea behind problem based learning is that the starting point for learning should be a problem. According to BOUD, KEOGH & WALKER (1985, p. 43) "Reflection is an important human activity in which people recapture their experience, think about it, mull over & evaluate it. It is this working with experience that is important in learning".

The sequence of learning in PBL is formalized as a learning circle and takes place in 4 main steps (according to BARROWS 2005):

1. Perception and analysis of the problem
2. Discussion with members of the learning group
   Hypothesis building (ideas / assumptions)
   Definition of learning targets
3. Self-study / research phase
   Enhancing existing knowledge
4. Discussion of results
   Verification and modification of hypothesis

This approach transferred to the OSM student workshop should lead to a more student driven learning process, stimulating a more enduring way of acquainting knowledge.

The approach has been introduced for the first time in winter semester 2013/14 and based on positive experiences continued in the following years.

2 Preparation of the Workshop

In the run-up phase of the one-day workshop students were asked to perform the following impromptu task:

"Compare for a spot on the world you are very familiar with the content of *Google Maps* and *Open Street Map* concerning completeness, accuracy and detailedness."

In other words: which of these data sources could be the better basis for a spatial planning project?

The results of the students' ad-hoc research have been compiled by a MOODLE poll and led to the following findings: one third of the students voted for OSM, another third for Google Maps and the last third thought both products to be equivalent. Over the years, the trend shifted clearly towards OSM, being selected in the recent master course as the better database by more than 50 % of the students.

The differences documented not only the varying stage of development of OSM in different countries, but also pointed out significant differences even for Germany, depending on the local activity of the OSM community.

The results of this ad hoc research should arouse the students' curiosity to look into the OSM project and get ready to use these data for future planning and design tasks.

3   Implementation of the Workshop

Stepping into the workshop, the students could divide into 2 groups: *Use of OSM* and *Contributing to OSM*. The framework of the workshop has been set as the seven-step approach according to the PBL method (http://www.materials.ac.uk/guides/pbl.asp). In order to stimulate the students to start into the first steps, for each group just one slide has been displayed, showing aspects of the topic in an iconographic way (Figure 1):

For "Use of OSM":

- Routing
- Projects using OSM as base map (examples: openpistemap.org, opencyclemap.org, wanderreitkarte.de etc.)
- Embedding OSM data in GIS-software (e. g. via WMS)
- Use of OSM on mobile devices (smartphone, etc.)
- Legal aspects of the use of OSM

For "Contributing to OSM":

- Editors for OSM data capture
- OSM data models and mapping techniques
- Devices for data capture (e. g. GPS receivers)
- Aspects of quality management (how reliable are OSM data?)
- Legal aspects of the use of OSM

Fig. 1:   Iconographic animation for topic selection of the working groups "Use of OSM" and "Contributing to OSM"

In the 1st ("I do not understand what … means?") and 2nd step ("The most important subtopics are …") the students sorted out the meaning of the given iconographic suggestions, supported by tutors' hints, if something was significantly misunderstood.

They derived subtopics of the subject area to be analyzed and made respective notes on a flipchart.

In the 3rd step ("I suppose that …"), based on a card inquiry, students compiled existing knowledge as well as open questions, and clustered them thematically in a 4th step ("What do we think together?") (Figure 2).

Fig. 2: Group work during steps 1 – 5

The work was rounded up in a 5th step by a compilation of "learning questions" that needed further research: "The most important open questions are …" (Figure 3).

These questions were scattered among the group members for further research that took place during the next 3 hours, mainly internet-based but also pursued by experiments with software products or smartphone apps found on the web (Step 6 / "These are my findings …").
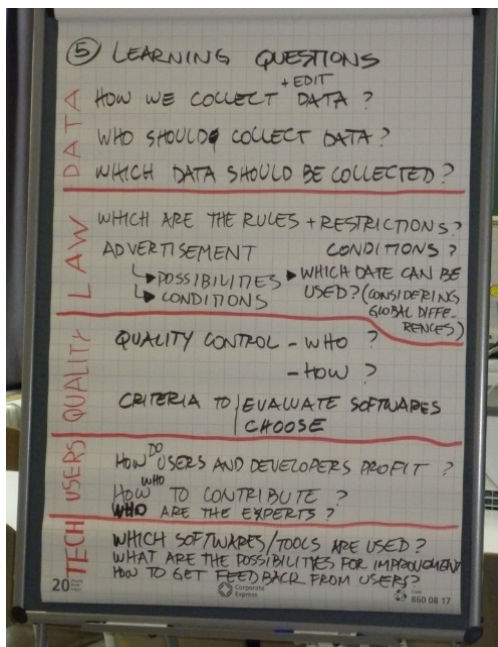

Fig. 3: Example for learning questions for future research, derived in step 5

The 7st step was implemented as an info market. Two students each stayed at each station (poster with research results), giving explanations to the others who rotated in a given timing cycle from station to station.

Having the passage completed, the roles were changed. Therefore, at the end each student has explained one aspect to the others and got explained all results of the day by the fellow students.
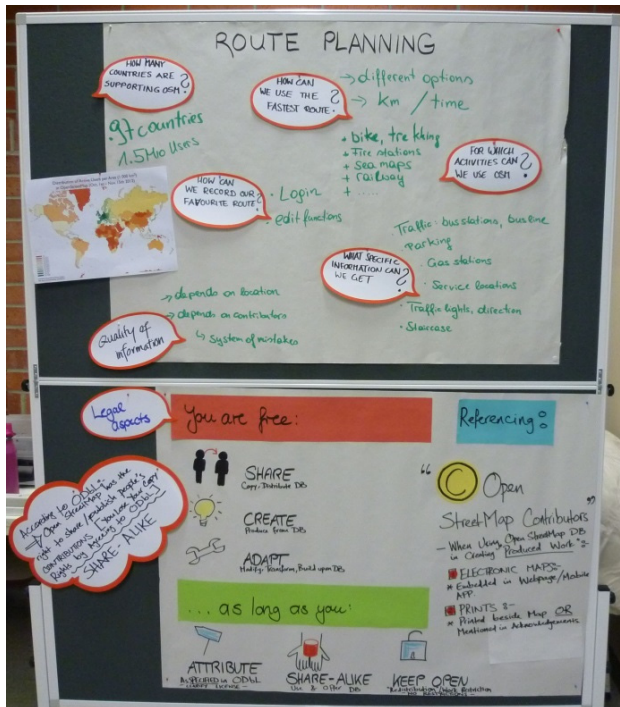

Fig. 4:   Example for a poster containing results of the research phase
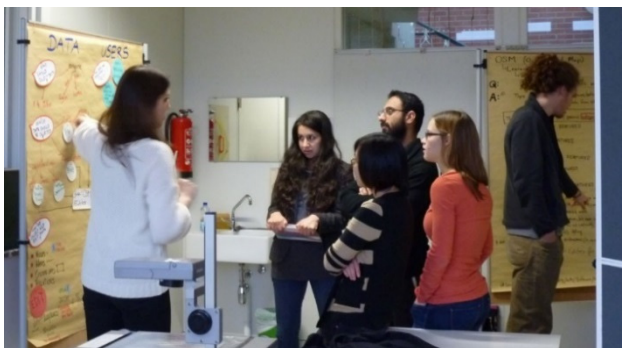

Fig. 5:   Students explaining each other during the info market the results of their research

4 Reflections at the End of the Workshop

The finale of the day was a plenum reflection, based on the following questions:

- Which role could OSM play in my further career?
- Are there open questions left today?
- Are there any other abilities that I have learnt/improved today?
    - Working under time pressure
    - Working in groups
    - Having to play a role
- Highlights? What would you change?

In comparison to the former lecturer centered approach, it can be summed up that the use of PBL as a teaching method led to an increased motivation on students' side.

The results of different years were not identical, because despite of tutorial supervision and steering an individual focusing on different partial aspects took place.

However, if the goal is defined in a way that students shall familiarize themselves with the opportunities of OSM, completeness of the results does not play the leading part. The focus goes more in the direction of exploiting new information resources. A consolidation of gained knowledge is always possible based on one's own initiative.

On the other hand, it must be stated that the preparation of the chosen procedure based on PBL led to an increased investment of time on the lecturers' side. For each working group a tutor is needed, which doubles the human-resource allocation of lecturers, compared to a more classical teaching approach.

Nevertheless, the positive results encourage continuing the described didactic path.

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