

The Experience of Using Geoportal in National Geography Olympiad in Estonia

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Abstract

For the past couple of years, the Estonian Land Board Geoportal has been effectively used in the Geography Olympiad's tasks. We analyzed how well students performed in these tasks and also what students and teachers thought about using the Geoportal for problem-solving tasks, and what was problematic or interesting in their opinion. The students' skills in using Geoportal were quite good and they were very interested in using it.

1 Introduction

GIS allows teachers and students to work together on problem solving tasks by collecting, recording, and analysing their own data to answer the questions of "What's where, and why is it there?" (MILSON & CURTIS 2009). This benefit of GIS in education highlights the role of GIS in empowering spatial thinking (KERSKI et al. 2013).

The Geography Olympiads are the famous phenomenon that also promote geo-media usage by students and develop GIS based competences (ROOSAARE & LIIBER 2013). Amongst the Geography Olympiads on a national and international level, more and more focus is being placed on the analytical skills of the students. The tasks usually comprise of analysis of spatial issues and problem-solving. Students are asked to gather different information from the maps and use it in decision making or planning exercises. Different geoportals and web maps can be effectively used for data-mining in problem-solving and planning tasks.

In Estonia, computer-based tasks were first included in the Geography Olympiad's written tasks for the secondary school level in 2005. Students had to find, interpret and analyze some geographical information from the internet portals (LIIBER & ROOSAARE 2007). During recent years, students participating in the final round of the competition have had to use thematic maps and spatial information from the Geoportal of the Estonian Land Board (ELB) (<http://xgis.maaamet.ee/xGIS/XGis>) to solve real life problems (ROOSAARE & LIIBER 2013). The Estonian Land Board Geoportal (see figure 1) creates access to different thematic web map applications, through which the Estonian Land Board mediates various spatial data managed by different owners. The Geoportal encompasses topographic data, orthophotos, LiDAR data, cadastral information, road register, environmental protection areas, soils, geology, historical maps, hereditary culture, mineral deposits and different restrictions relevant to planning. There are also tools for making info query, measuring distances, heights, areas, determining coordinates etc.

We analyzed how well students use the Geoportal in problem-solving, and what problems students and teachers encountered in using the Geoportal.

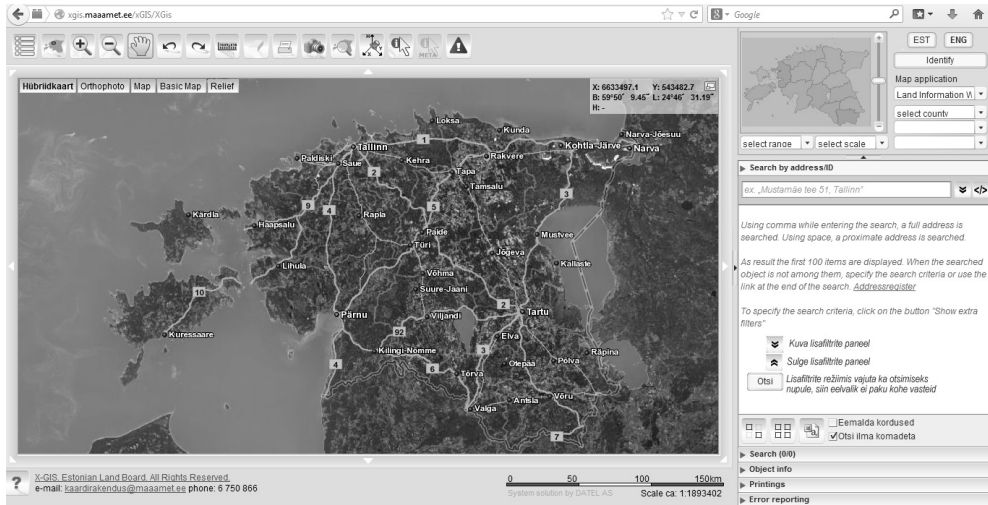


Fig. 1: The Estonian Land Board Geoportal

2 Methods

During the last two years 71 students aged between 16 and 19 had to use the Estonian Land Board Geoportal for problem solving in the Geography Olympiad. The tasks were solved in the e-learning environment (Moodle) by using the help of the Geoportal. The tasks were comprised of different parts: measuring distances and heights, calculating slopes, determining coordinates, identifying restriction areas, determining housing areas from historical maps etc. For example, secondary school students had to use this Geoportal in order to analyze the situation related to the opening of a sand quarry in a parish of South-Estonia by identifying different restrictions, measuring heights, suggesting a route for sand transportation and making an impact assessment. All the tasks were taken from real life situations.

We used a facility index to evaluate the difficulty of the tasks. The higher the facility index, the easier the question is (for this cohort of students).

$$F_i = 100 \frac{\bar{x}_i - x_i(\min)}{x_i(\max) - x_i(\min)}$$

Where x_i is the student's score on a particular item; $x_i(\max)$ is the maximum question grade and $x_i(\min)$ is minimum grade.

We also compared the results between the genders using a Mann-Whitney U Test. In addition to this, we performed a questionnaire after the Olympiad, where students and

teachers were asked how difficult or easy they found the tasks to be, and what the problems were in their opinion.

3 Results

The easiest tasks for the students were finding the location with given coordinates and identifying whether a given point or area was in some restriction area or not. Over 90% of the students found the right location and determined the restriction area correctly. These tasks required from students the ability to find the right data layer, or/and make the query. Measuring distances was also an easy task for the students. However, if the task required orientating between different data layers and taking into consideration multiple data then the results weren't so good, and less than 50% of the students performed well. Students' decision making skills were good once they found the right information.

In measuring heights 78% of the students performed well but calculating slopes was more challenging and only 64% of the students found the correct answer. When comparing boys and girls then there was no significant difference in their performance, but from figure 2 it can be seen that boys' grades were slightly higher in both years.

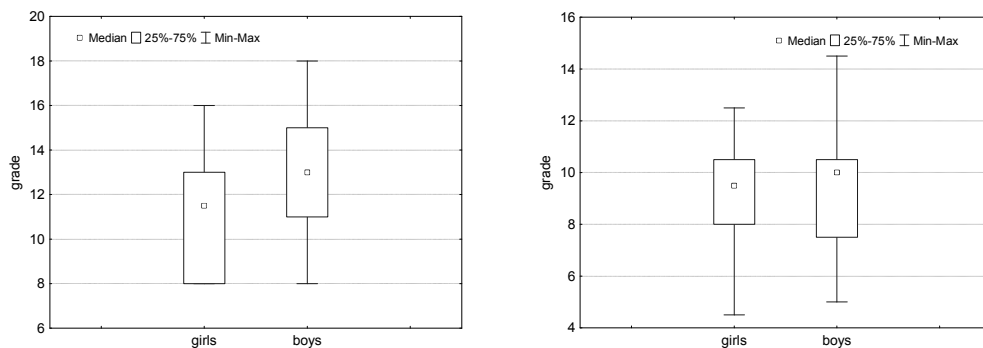


Fig. 2: Box-plots for girls and boys grades in Geoportal tasks in year 2012 on the left and in 2013 on the right

The main problems that were brought to light in the questionnaire were mainly related to the slow internet connection which made the Geoportal slow. However, the students found the tasks to be very interesting and executable. The teachers were more skeptical about the Geoportal and its usage, mostly because it was difficult for them to handle the Geoportal and it took them more time to find data.

The results showed that students were very interested and ready to use the Geoportal for solving different spatial problems. Teachers were less eager to use the Geoportal, but they also agreed that it is an important part of e-learning, and opens up many opportunities to create more diverse tasks which demand elementary spatial analysis skills.

4 Conclusions

Geoportals offer many opportunities to learn and improve students' spatial thinking. They also enable students to diversify learning and make it more practical. In Estonia, the Estonian Land Board Geoportal is also used officially in different administrations for decision making, making it good for students to already gain practical experience using the Geoportal in secondary school. Moreover, students and teachers valued highly the practical value the tasks gave them, and altogether students found these problem-solving tasks to be the most interesting ones.

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