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Pupils as GIS-Experts in the Context of Flood Risk – An Interactive Learning Environment for Secondary Schools

Roland Goetzke (1), Henryk Hodam (1), Andreas Rienow (1), and Kerstin Voß (2)

(1) Department of Geography, University of Bonn, Bonn, Germany (r.goetzke@geographie.uni-bonn.de), (2) Department of Geography, University of Education Heidelberg, Heidelberg, Bonn (voss@gis-station.info)

Floods and their destructive consequences for local residents are distributed in the media periodically and are, accordingly, noticed by students. Especially the discussion about the impacts of an anthropogenic climate change on the frequency of extreme events reinforces the importance of addressing the subject in school curricula. Remote sensing and GIS offer a wide range of methods for analyzing problems of vulnerability and risk, but are normally not recognized in school education. Reasons for this are: teachers have not been taught how to use and interpret remote sensing data, and there is only little material or software which can be integrated into school lessons without considerable effort.

The main goal of the German FIS-project ("Fernerkundung in Schulen" – "Remote Sensing in Schools") is the development of easy-to-use e-learning material in order to apply remote sensing methods in schools and thereby enforcing learning mechanisms based on the moderate constructivist learning theory. The interactive learning unit "Floods – Dealing with a constant threat" is a learning module for a double lesson that enables young students from age 12 to 16 to use geo data for a site analysis especially focusing on the threat of floods. Following a guiding question from a real-world situation, the students are in demand as experts for site analyses and, in the process, need to identify problems arising with a location decision. Their investigation includes measurements in the three-dimensional space of a study area near the Rhine River. Therefore the students are provided with data from a Digital Elevation Model (DEM), a satellite image and several GIS-layers. The different data sets have to be combined in order to achieve valuable results. At certain points the pupils need to reflect their decisions after incorporating new information against the background of flood risk.

The presented learning module is designed in Flash and, thus, is platform-independent. It is freely available on the project's website. While animations impart background information, e.g. the generation of a DEM, the main module relies on real-time simulation. The learning module incorporates elements of game-based learning by making use of interactive simulations and design elements appealing to children and adolescents in order to engage them with the story, but it has a strong focus on the appropriate use of geo data in a scientific context all the same.