Demo “3D printed geographical surfaces” for Fablearn Europe 2016 at UCLan

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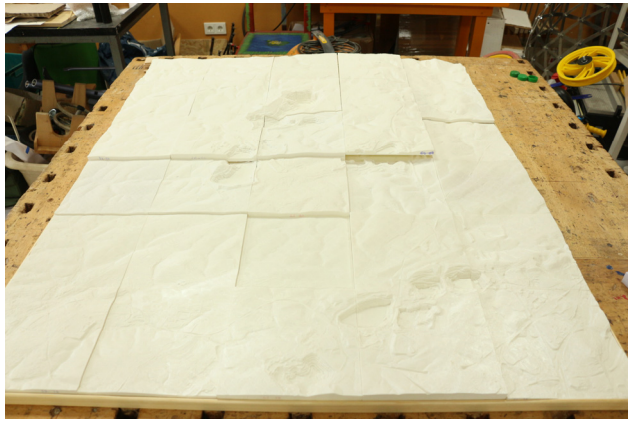
Abstract
Updated 5/20/2016. This document describes a demo for the 2nd Fablearn Europe Conference, where visitors were shown self-made geographical surfaces for educational purposes in different subjects.

Author Keywords
Geographical surface, relief, landform configuration, elevation model, 3D printing, geography, GIS, makerspace, school

Suggestion for a demo
At the demo this self-made elevation model will be presented. Additionally some tiles of different types, approaches and target groups are shown:



Idea and approach

Geography as a school subject mostly works with abstracts concepts which are hard to handle by pupils: Maps are two-dimensional representations of the real world, usually in scales which are hard to understand. So, scales often are just numbers for children, they don't have to do something with their own life experience.

Also, for beginners it's often hard to find motivation for geography while learning rivers, mountains, cities and countries far away from their own home. Some of them are interested because of films they saw or stories they heard of. Some of the girls in the class may be want to know where polar bears are living and where the penguins are diving through the ocean. May be a boy is interested in volcanoes… But most of the pupils in middle school don't have any relation to geographical facts and connections.

And, the developments of the modern world with GPS, mobiles phones etc. in the last decades lead to further abstraction und distance: Often Children in cities don't know the way from their home to school. Over-careful parents bring their children in the morning by car and pick them up at the afternoon. Nearly all ways are done by satellite-guided car transportation – children often don't learn orientation in their environment. Noise barriers along the roads makes it difficult to recognize typical landmarks etc.

The demonstrated project is searching a way to work against these trends – also through modern techno-logy. The basic idea is to provide tools and workflows for making three-dimensional models of the student's environment. No kid really can handle by nature a map in a scale of 1:1.000.000 of a countryside 10.000 kilometers away. But they can handle a 3d model in a scale of 1:5.000 or 1:10.000 of their own home town or village! They recognize the long road up the hill where it is so hard to ride their bicycle, they can touch the stone pit outside the town with it's deep cut in the countryside, they can feel the course of the river through their town. It's here, they can see the surface, and they can touch it three-dimensionally!

To bring the face of the home countryside to the pupils is the main goal of this project – for making geography and orientation recognizable.

Figure: Example of a 3d-printed elevation model of the countryside around Wülfrath in Germany, home of the Freie Aktive Schule Wülfrath (FASW) where the project is being developed. In the upper middle Europe's largest limestone pit, about 200 m deep.

But, in the school where the project is being developed pupils are usually not just ‘consumers’ of predefined and pre-produced teaching materials – often they learn while exploring and inventing things for teaching. So, another aim of the project is to show how pupils can get involved in developing complex teaching materials for use in their own school and elsewhere.

The demo

The demo for the audience mainly shows the following:

- A desk where 30 parts (5 west-east direction, 6 north-south direction) are placed (see figures). The tiles are 19 cm squares, up to 5 cm high. So, this results in a rectangular area with 95 cm width and 114 cm depth which should be placed in a comfortable desk height (about 85 cm). Visitors can see and even feel the surface, there is no sign showing “Don’t touch”

- A beamer is placed above the model and projects different sceneries on the surface. A loop of several visualizations is shown exactly fitting to the elevation model – Google Map, Open Street Map, info text, satellite view, a noise map and some other environmental data.

- Beside the model/projection area some other small related objects are shown: 3D-printed tiles for different purposes – a tactile map for blind people, a detail cutting of the relief in smaller scale, a colour relief of the region in a bigger scale etc.

Figure: Examples of different types of 3d-printed elevation models – city of Wülfrath, Düsseldorf and Neanderthal area with river Rhine, hills, stone pits and landmarks

What's needed at the venue:

- desk, about 85 cm height, >2 m wide, >1,20 m depth, space around for visitors, if possible walkable around the desk, overall space >~10 sqm
- beamer above with ~vertical orientation, must be justable and fixable, if possible HDMI, if possible ~3000 Lumen depending of the ambient light conditions, electricity and place for a notebook
- demo can both run stand-alone in automatic loop mode and user controlled with short explanations

We prefer to prevent costs caused by shipping technical equipment, so in case of acceptance of this demo we would hope to find the needed devices at UCLan. Otherwise we can bring our own equipment, best way

is to communicate about that challenge.

Who we are

The "Freie Aktive Schule Wülfrath" (FASW) is a private Democratic middle School in Germany near Dusseldorf. Our Pedagogy is guided by Maria Montessori and Rebeca & Mauricio Wild. We established probably the first Makerspace in a german middle school with focus on both traditional crafting techniques and Digital Fabrication like 3D-printing. Students learn to tinker here, to make, to build, to invent and to express their own ideas.

Short announcement for the demo

The german school FASW shows a 3D-printed elevation model of their local environment which they developed for teaching geography, history, navigation, GIS, and last but not least digital fabrication. A landscape model generated from actual elevation data of the area serves as canvas for a set of different overlays projected by a video projector from above.

Acknowledgements

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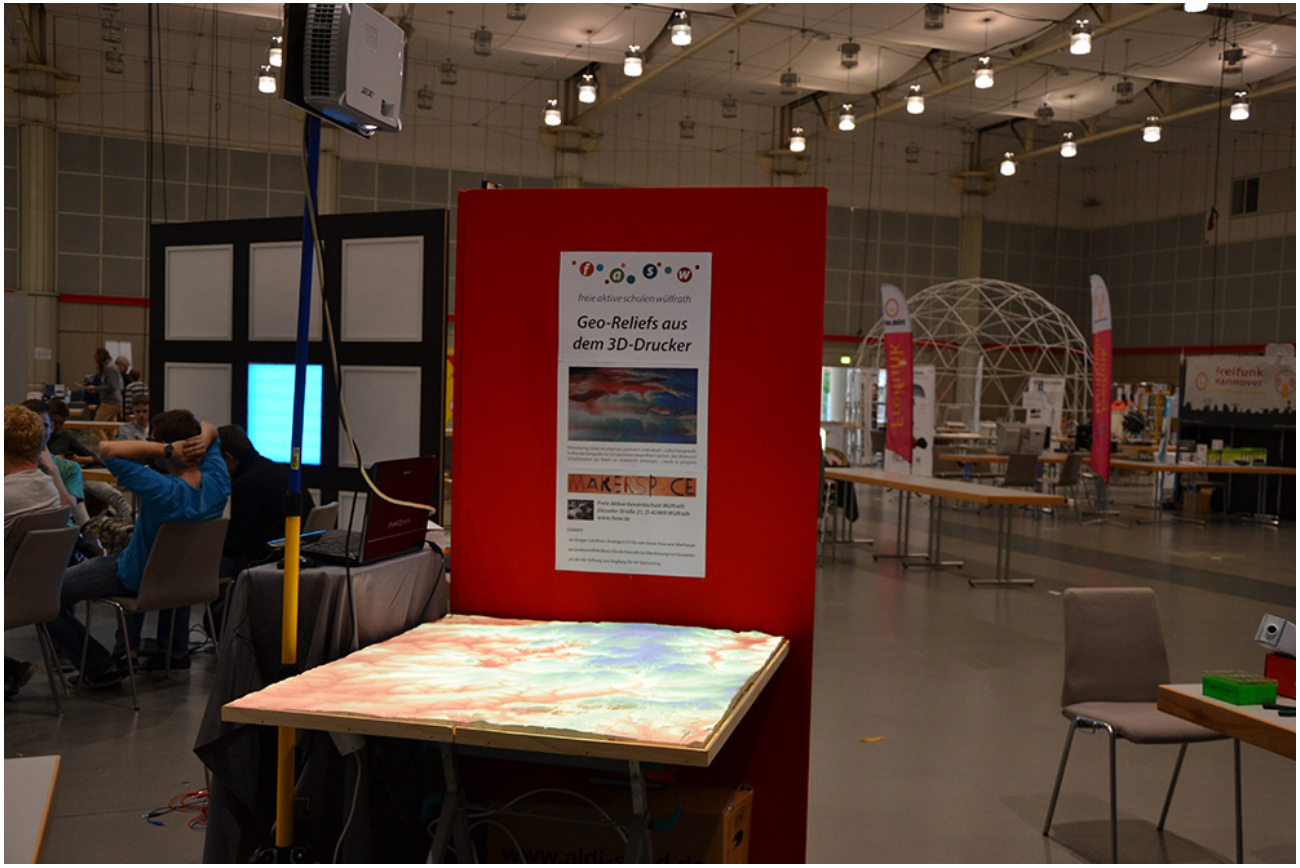
References

[1] www.fasw.de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