

ELWIRA “Plants, wood, steel, concrete - a lifecycle as construction materials” : University meets school - science meets high school education

Alexandra Strauss-Sieberth (1), Alfred Strauss (2), Gerda Kalny (3), Hans Peter Rauch (4), and Willibald Loiskandl (5)

(1) Institute of Hydraulics and Rural Water Management, University of Natural Resources and Life Sciences, 1190 Vienna, Austria, (alexandra.strauss-sieberth@boku.ac.at), (2) Institute of Structural Engineering, University of Natural Resources and Life Sciences, 1190 Vienna, Austria, (alfred.strauss@boku.ac.at), (3) Institute of Soil Bioengineering and Landscape Construction, University of Natural Resources and Life Sciences, 1190 Vienna, Austria, (gerda.kalny@boku.ac.at), (4) Institute of Soil Bioengineering and Landscape Construction, University of Natural Resources and Life Sciences, 1190 Vienna, Austria, (hp.rauch@boku.ac.at), (5) Water Management, University of Natural Resources and Life Sciences, 1190 Vienna, Austria, (willibald.loiskandl@boku.ac.at)

The research project “Plants, wood, steel, concrete – a lifecycle as construction materials” (ELWIRA) is in the framework of the Sparkling Science programme performed by the University of Natural Resources and Life Sciences together with the Billroth Gymnasium in Vienna. The targets of a Sparkling Science project are twofold (a) research and scientific activities should already be transferred in the education methods of schools in order to fascinate high school students for scientific methods and to spark young people’s interest in research, and (b) exciting research questions not solved and innovative findings should be addressed. The high school students work together with the scientists on their existing research questions improve the school’s profile and the high school student knowledge in the investigated Sparkling Science topic and can lead to a more diverse viewing by the involvement of the high school students. In the project ELWIRA scientists collaborate with the school to quantify and evaluate the properties of classical building materials like concrete and natural materials like plants and woodlogs in terms of their life cycle through the use of different laboratory and field methods. The collaboration with the high school students is structured in workshops, laboratory work and fieldworks. For an efficient coordination/communication, learning and research progress new advanced electronic media like “Moodle classes/courses” have been used and utilized by the high school students with great interest. The Moodle classes are of high importance in the knowledge transfer in the dialogue with the high school students.

The research project is structured into four main areas associated with the efficiencies of building materials: (a) the aesthetic feeling of people in terms of the appearance of materials and associated structures will be evaluated by means of jointly developed and collected questionnaires. The analysis, interpretation and evaluation are carried out in close cooperation between the scientists and the high school students, (b) high school students perform classical as well as advanced laboratory testing procedures on the selected materials under the guidance of researchers. They determine a set of mechanical properties and mechanical short and long term performance indicators, such as compression strength, Young modulus, fracture energy etc., (c) field tests on sites are performed to specify climatic characteristics of the examined materials, in order to find out their impact on the surrounding microclimate caused by for instance solar radiation and air temperature, and (d) finally an energy balance (CO₂) for the selected materials over their entire life cycle will be carried out by the scientists. These results will provide an important contribution to a sustainable, climate-friendly and resource conserving handling with building materials.

The aim of this poster is to present and discuss alternative scientific approaches of scientific working between scientists and high school students and to discuss the learning outcomes already obtained by the high school students within the project “Plants, wood, steel, concrete – a lifecycle as construction materials” ELWIRA.