The enhancement of environmental literacy of High School students within the Sparkling Science project "Traisen w3"

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Environmental literacy is the knowledge necessary to understand the environment as an ecological system. It comprises the insight in the impact of human behaviour on the natural world and the disposition and motivation to apply ones knowledge, skills and insight in order to make environmentally beneficial decisions as rational citizen. The United Nations Environmental Programme states that young people will face major challenges in providing sufficient water and food, generating energy and adapting to climate change in future.

Dealing with these challenges will require a major contribution from science and technology. But even more important, it is an issue of education to transfer the required system understanding as a basis to take informed decisions. In this way an education towards environmental literacy contributes significantly to the personal, social, and professional lives of young people, plays therefore a central role in young person's "preparedness for life", and is a major prerequisite for sustainable development.

For the purpose of developing new and engaging forms of learning, "Sparkling Science" projects are funded by the Federal Ministry of Science, Research and Economy in Austria. These projects target at integrating science with school learning by involving young people into scientific research. Within the Sparkling Science Projects "FlussAu:WOW" and" "Traisen.w3" scientists work together with 15-18-year-old students of an Austrian High School over four years. The projects aim to assess and evaluate crucial functions and processes of riverine landscapes particularly considering the floodplain area in near natural and anthropogenically changed landscapes. Within the first project "FlussAu:WOW" (2012-2014), students and scientists elaborated on indicators for assessing and evaluating the ecological functionality of floodplains and rivers. In a case study in the "Traisen.w3" project (2014-2016), scientists and students will focus at the catchment level of the river Traisen in Lower Austria and investigate ecological and cultural ecosystem services in these river landscapes.

From the second year on (2014), students are going to develop qualitative causal models on processes in river floodplain systems by means of the learning software "DynaLearn". It is an engaging, interactive, hierarchically structured learning environment that was developed within the EU-FP7 project "DynaLearn" (http://www.dynalearn.eu) to capture and simulate cause-effect relationships across disciplines and scales. Students work in small groups and are forced to think about processes and interactions of hydrological, biological, ecological, spatial and societal elements. Within this setting the collaborative problem solving competency is necessary to develop by sharing knowledge, understanding and different perspectives.

The students start with building their own causal models, perform simulations and develop scenarios for the development of the catchment. Thus the students' understanding of environmental processes in river landscapes is advanced. As an important benefit, scientists learn about viewpoints and conceptions young people have on their environment.

Formative evaluations of the effectiveness of different methods of collaboration between scientists and students will be conducted during the whole project. The results of the motivation questionnaires and pre- and mid-tests clearly highlighted the potential of the multi-modal collaboration approach to be used to communicate essential knowledge and skills in environmental understanding.