

The EU-Project PARRISE at the University College of Teacher Education Lower Austria

Franz Radits¹, Elisabeth Inschlag¹, Gerlinde Schmid & Christine Heidinger

Abstract

Since January 2014 the University College of Teacher Education Lower Austria is part of the EU-project PARRISE (*Promoting Attainment of Responsible Research & Innovation in Science Education*; www.parrise.eu). Franz Radits and Elisabeth Inschlag, both biology teacher educators at this institution, work together with science teacher educators all over Europe (18 institutions, in 11 countries) in order to develop, implement and do research on innovative teacher professional development courses (TPDs) with a specific focus on bringing together science education and citizenship education.

This paper will give a brief insight into the theoretical underpinnings of the PARRISE project and into the developmental work carried out so far at the University College. In order to deliver a vivid expression of our developmental work we will report on the Mini congress “The Danube River – conflicts over use”, which was the final event of our TPD course in June 2016.

1 Socio-Scientific Inquiry-Based Learning (SSIBL) – the novel pedagogical framework in PARRISE

Combining science with society at school is the aim of the PARRISE project. In that way, young people feel more engaged in science, experiencing its societal impact. For this objective the theoretical framework in PARRISE (Levinson, 2015) integrates two pedagogical approaches: learning based on socio-scientific issues (SSI) and inquiry-based science education (IBSE):

Socio-scientific issues (SSIs) are controversial social issues with links to science (Sadler, 2004). These issues offer no simple solutions; they are complex and open-ended and involve conflicting perspectives and interests of the different stakeholders as well as knowledge from different disciplines (science, politics, ethics, economy, etc.). SSIs may be global issues like “climate change”, “genetically modified food”, etc. or local issues such as a neighbourhood environmental crisis (Sadler, 2011). Learning based on socio-scientific issues aims at helping the learner to understand the controversy around a SSI, as a prerequisite to make an informed decision as a responsible citizen.

Inquiry-based science education (IBSE) is a teaching and learning approach that involves pupils in the process of scientific inquiry. Pupils actively carry out their own research: they pose research questions, develop research designs by using scientific methods, collect and interpret data, etc. Inquiry based science learning helps learners to get to know how scientists think and act when they are doing research and it gives learners an insight into the main characteristics of scientific inquiry and scientific knowledge.

In PARRISE these two pedagogical approaches are combined in order to give pupils insights into complex societal issues by letting them examine the controversy around a SSI with the help of scientific and social scientific methods. This integrated approach is called **Socio-Scientific Inquiry-Based Learning (SSIBL)**.

In PARRISE professional development courses (TPDs) for science teachers are developed, shared and improved across Europe. These TPDs aim at developing SSIBL competencies among European primary and secondary science teachers and teacher educators. In addition, the project develops learning tools and teaching materials for science teachers based on the SSIBL approach. The resources and best practice are disseminated through the PARRISE website (www.parrise.eu).

¹ Pädagogische Hochschule Niederösterreich, Mühlgasse 67, 2500 Baden.
Email corresponding author: franz.radits@ph-noe.ac.at

2 PARRISE developments at the University College for Teacher Education Lower Austria

Within the PARRISE project a TPD course for pre-service teachers (PSTs) was developed for the University College for Teacher Education Lower Austria. We chose a local socio-scientific issue, namely the topic of 'The Danube and conflicts over use'. The course was carried out in the summer semester 2016. Twelve face-to-face units between pre-service teachers and teacher educators took place (in total approx. 35h; 5 ECTS).

Course description: At the beginning of the course the teacher educators gave the pre-service teachers the chance to work and learn in a SSIBL environment themselves: The pre-service teachers carried out analysis of small rivers which join the Danube and discussed their results (=IBSE approach). In the course of four excursions they studied natural and denatured sections of these rivers (the Danube, 'Tribuswinkler Au', Schwechat) and they checked the water quality by leading organism. Two expert lectures on river restoration and conflicts of use along the Danube by Prof. Thomas Hein (University of Natural Resources and Life Sciences, Vienna) and Prof. Fritz Schiemer (University of Vienna) provided the necessary biological knowledge. Afterwards the pre-service teachers collected information on self-addressed open questions via a literature search and present their findings. The pre-service teachers discuss their findings and try to map emergent controversies which arise in this field (= SSI approach). After this learning experience the SSIBL framework was introduced to the pre-service teachers in order to link the SSIBL learning experiences to pedagogical considerations. In a last step the pre-service teachers developed small SSIBL projects according to the SSIBL framework in the field of 'rivers & conflicts of use' for lower secondary education (for approx. 4 lessons) and got feedback from their peers and the teacher educators.

At the end of the course a Mini Congress around the topic "The Danube River – conflicts over use" was organized which will be presented in the next chapter. This congress was the closing event to three teacher professional development (TPD) courses which were developed and implemented during the summer semester 2016 within the EU-project PARRISE: The TPD course for pre-service biology teachers at the University College of Teacher Education Lower Austria, a TPD course for in-service biology teachers and one for pre-service biology teachers at the University of Vienna.

3 PARRISE Mini Congress "The Danube River – conflicts over use": Pre- & in-service biology teachers, pupils, limnologists and teacher educators meet and discuss their findings

On the 1st of June 2016 approximately 70 people met in the festival hall of the oldest grammar school in Vienna, the Academic Gymnasium. Among the participants were school students, scientists from the field of limnology, experienced biology teachers as well as novice teachers and teacher educators. This highly diverse group of people came together at a mini-congress entitled "The Danube River – conflicts over use". All participants have worked in one or another form at the topic "conflicts over use at rivers" for the summer semester 2016 and now was the time to exchange insights and approaches around the shared topic.

The congress was opened with a **keynote by Fritz Schiemer** who is a limnologist from the University of Vienna. In his talk Fritz Schiemer introduced the participants to the history of the Vienna Danube, which can be read as a 150-years-long conflict over use. In former times the Vienna Danube was an eight kilometre wide wetland comprising of a patchwork of numerous streams meandering through today's city area. But major floods ever since threatened the Viennese population and as soon as the technical progress allowed for it, extensive flood-control engineering (dams and levees) led to the first regulation of the Vienna Danube in 1870. Land reclamation, requirements of inland navigation and the need for energy via hydropower led to further straightening and damming of the river. Nowadays the Danube, like all other major European rivers, is highly regulated with hardly any adjacent floodplains left. This has a major impact on the ecosystem of the Danube. The key factor determining the ecology of large rivers and their adjacent floodplains is the high hydrological connectivity between the two compartments which is strongly reduced in case of straightening and damming. Since the 1980s restoration projects therefore seek for solutions to restore the damaged or destroyed ecosystems of rivers and floodplains. But restoration projects harbour considerable conflict potential as Fritz Schiemer experienced himself. He gave the example of a restoration project for the free-flowing stretch of the

Danube near Vienna. A multi-disciplinary team consisting of ecologists, hydrologists, waterway operators and representatives of the city administration argued for three years until finally they came up with a compromise which satisfies the needs of the Danube's ecosystem as well as the requirements of the shipping industry.



Figure 1: The limnologist Fritz Schiemer gave an introduction into conflicts over use around the Vienna Danube



Figure 2: At the poster session novice teachers presented their teaching approaches around the topic "The Danube River-conflicts of use"

In the second part of the congress a **poster session** was staged. Novice teachers presented their teaching approaches around the topic “The Danube River – conflicts over use” and discussed them with the other participants at the congress. The development of the teaching approaches took place in two teacher professional development courses at the University College for Teacher Education Lower Austria and University of Vienna. The novice teachers worked for one semester on knowledge about river ecosystems, on historical and present conflicts over use at the Vienna Danube and their ecological impacts. With the help of the SSIBL framework they developed teaching approaches which strive to bring these topics to biology classes. As part of their lesson plans the novice teachers chose an interesting and captivating entry for students, developed students activities for a stakeholder analysis and the mapping of the controversy. Thanks to experienced biology teachers who were willing to invite pairs of novice teachers to their biology classes, the novice teachers were able to try out their teaching units in class. One of these classes, students from the upper secondary school “Gym Tulln”, also participated in the congress. They worked with two novice teachers from the University of Vienna on the ecosystem of a little river which flows near their school building, called “Kleine Tulln”.



Figure 3: Students from the “Gym Tulln” presented their school project on the water quality of the little river “Kleine Tulln”

The students studied the water quality by leading organisms at two sections of the river: a natural and denatured section. The students discerned different stakeholders which declare specific interests in the river (farmer, population: flood control) and related it to problems for the river’s ecology.

At the end of the event, **discussants** from each participant group were invited to share their impressions from the mini congress with the other participants. Fritz Schiemer and Günther Pass spoke for the group of scientists. They both were impressed by the diversity of the projects presented by students and novice teachers and they also praised the authenticity regarding the ecological content and applied methods. The scientists highly recommended sharing the developed lesson plans with the community of biology teachers in Vienna. Lisa Maria Reiss spoke for the novice teachers and she emphasized the value of the congress as an exchange forum to share and discuss different teaching approaches with peers, students, teacher educators and scientists. A student from an upper secondary school in Vienna gave insights into the students’ view on the congress. He said that it was interesting to see what their peers in other schools did in their projects. In general it was fun for him to participate in the congress. Markus Gruber, an experienced biology teacher, told the audience that he enjoyed being part of this big teacher professional development initiative. He benefited from the scientific input of experts, from the new pedagogical approaches from the EU-project PARRISE and the fresh impetus of the young colleagues who tried out their lesson plans in one of his classes. We, the teacher

educators, who were the organizers of this event, concluded the congress with our statement. We were impressed by the lively and interested exchange between the quite diverse actors of this event and were happy that such a fruitful event brings to a close an intense semester of joint hard work.



Figure 4: At the end of the congress discussants shared their impressions from the event with the other participants

4 An Outlook to the final year in PARRISE

The upcoming year 2017 is the final project year of PARRISE. At the University College for Teacher Education Lower Austria the TPD course developed and described earlier in this paper will be implemented for the second time. Experiences from the first round were systematically collected and analysed with the help of social scientific methods and within the paradigm of action research (Whyte et al., 1989) and are currently used to re-design the TPD course. After the second round, data on the pre-service teacher's professional development in our course will be collected and analysed again. The results will be published in an action-research paper which introduces to the Model of TPD developed at the University College and its impact on teachers' learning.

Literature

- Levinson, R. (2015). Promoting Attainment of Responsible Research and Innovation in Science Education. Theoretical framework of the FP7-EU-Project PARRISE (Project No. 612438). London.
- Sadler, T. D. (2004). Informal reasoning regarding socioscientific issues: A critical review of research. *Journal of Research in Science Teaching*, 41, 513-536.
- Sadler, T. D. (2011). Situating socio-scientific issues in classrooms as a means of achieving goals of science education. In: T.D. Sadler (Ed.). *Socio-scientific Issues in the classroom. Teaching, learning and research*. S. 1-10. Springer: New York.
- Whyte, W.F., Greenwood, D.J. und Lazes, P. (1989). Participatory Action Research. *Through Practice to Science in Social Research*. *American Behavioral Scientist* 32(5): 513-551.