



Promoting Attainment of
Responsible Research &
Innovation in Science
Education

Newsletter

June 2016

DEMOCRATIC CITIZENSHIP EDUCATION IN INQUIRY-BASED LEARNING AND TEACHING

WWW.PARRISE.EU

Editorial

by Christine Knippels & Frans van Dam, PARRISE coordinators

Freudenthal Institute for Science and Mathematics Education. Utrecht University, The Netherlands

After a first round of testing the PARRISE approach in teacher professional development sessions (TPD), partners concluded that this approach has been a success. In 11 countries, over 900 pre-service and in-service teachers participated in the TPDs offered by the PARRISE partners. The PARRISE TPD approach is called SSIBL: Socio-Scientific Inquiry-Based Learning. In these TPDs, science and mathematics teachers have acquired the knowledge and skills to integrate the RRI dimensions in science education classes, using an inquiry-based approach. On many occasions, teachers were stimulated to develop their own teaching materials.

TPD courses are balanced between theoretical and experiential approaches: in these TPDs, the participating teachers have various roles: learners, designers, teachers as well as reflective practitioners. Participating teachers include teachers at the primary school level, as well as teachers for lower and upper secondary schools.

Targeting teacher educators and teachers ensures the continuity of teaching SSIBL, and allows for the flexibility required to address the large variety of educational systems in Europe. Moreover, several partners have been successful in integrating SSIBL beyond the local level. In the UK, two universities, UCL Institute of Education and University of Southampton collectively carry out TPDs. Klagenfurt University in Austria has introduced SSIBL in the 'Climate schools' project in three regions in Carinthia (10 schools and about 250 students). In Sweden, Umea University has been invited by the Swedish National Agency for Education to develop learning materials aligned with the PARRISE framework. Most partners have presented the SSIBL approach at national or international meetings for teachers, teacher educators or science education researchers.

The insights and experiences with the TPD courses in the school year 2015-2016 will be used to improve the second round of TPDs in the next school year and the SSIBL framework. At the end of 2017, the SSIBL framework will be available in the form of a teacher guide. Examples of full TPDs and teacher and learning activities will then be provided.

Read through our fifth project-wide newsletter to discover how the PARRISE project is progressing. In this newsletter you can find a range of examples, showing how the PARRISE approach is tested and implemented in practice.

Don't forget to visit our website at www.parrise.eu for more information on the project, including the new PARRISE YouTube channel with many informative videos about the PARRISE approach!

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Save the date: Final PARRISE conference

The final PARRISE conference will take place in conjunction with the [ESERA 2017](#) conference on the 19th and 20th of August 2017, at Dublin City University, Ireland. More information will be posted later this year in our next newsletter and on our [website](#).

PARRISE Project: 'Excellent'

The PARRISE project 'has made excellent progress' according to the mid-term review committee appointed by the European Commission to assess the project status in June 2016. The committee concluded 'that the project has successfully achieved a fusion between RRI, citizenship education, socio-scientific issues and inquiry-based learning.' The experts further state that the impact of PARRISE 'will be achieved by changing the mind-set and culture of STEM teaching' and that the project has the capacity to promote interdisciplinarity in school subjects.

'The conclusions by the mid-term review committee are very encouraging. We will now take their recommendations to further improve the impact of our project', stated the PARRISE coordinator, Dr. Christine Knippels.

Project news

PARRISE 4th consortium meeting at the University of Vienna

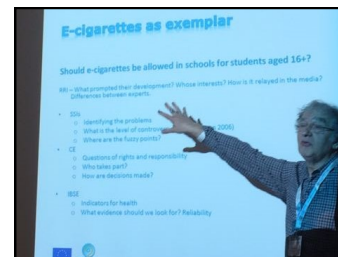
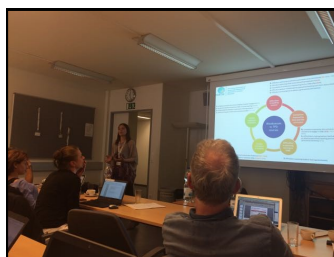
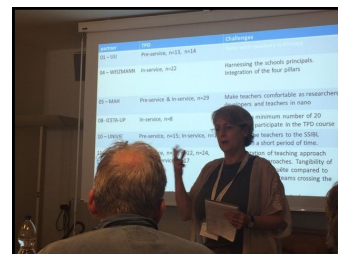
by Frans van Dam

Freudenthal Institute for Science and Mathematics Education. Utrecht University, The Netherlands

From 24 to 27 May 2016, the 18 partners of the PARRISE project met in Vienna to discuss their progress in Teacher Professional Development (TPD) in the 11 participating countries. The meeting was hosted by Christine Heidinger and Franz Radits of the University of Vienna.

Partners shared their experiences with the first round of their TPDs, based on the PARRISE theoretical framework. Their objective was to learn from each other's experiences in order to improve the TPDs for the second round. At the meeting, special attention was paid to discussions about the evaluation of the TPDs, as well as about the dissemination of PARRISE experiences and materials to key stakeholders outside of the PARRISE project, such as teachers and policy-makers.

After four intensive days, coordinator Christine Knippels from Utrecht University concluded that the project consortium had made a lot of progress and gained many new insights for an improved second round of testing the TPDs, the results of which will be discussed in Toulouse in 2017.



Figures 1-4. Snapshots from the PARRISE 4th consortium meeting.

Introducing the PARRISE YouTube Channel

by Eleni A. Kyza

Cyprus University of Technology, Cyprus

PARRISE launched its own YouTube channel, with brief videos on the PARRISE project. The respective deliverable (D6.11) is due on month 48, but the [first videos](#) are already online. The first video, by PARRISE coordinator Christine Knippels, provides a brief but concise introduction to the PARRISE project. A second video by Stockholm University [SU, P19] highlights the key points of their TPD program during 2015-16. Other

videos by CUT [P9] present a short interview with a former Cyprus Commissioner for the Environment on the topic of RRI, and an experiential activity undertaken as part of the first PARRISE TPD program (2015-16) in Cyprus. Finally, two more videos by the UCL Institute of Education [UCL IOE, P2] provide a presentation of the Socio-scientific Inquiry-Based Learning (SSIBL) educational framework by Dr. Ralph Levinson, and the

PARRISE-related experiences of pre-service science teachers in the UK. The PARRISE YouTube Channel is an innovative dissemination venue for the project. As the PARRISE work matures, more dissemination activities are expected to take place by the PARRISE partners and additional project videos produced for the PARRISE YouTube channel are anticipated.

PARRISE database for best practices

by Eleni A. Kyza

Cyprus University of Technology, Cyprus

The project is in the process of developing a Best Practices online database, which will provide stakeholders and visitors to the website information on each of the Teacher Professional Development (TPD) programmes organized in each participating country. The first examples are already [online](#), providing a glimpse into TPDs organized during the first TPD series.

In addition to the Best Practices database, the project will present exemplars from student and classroom materials to support

the understanding of how the SSIBL framework can be implemented in real-world settings. The following are some examples of the topics being addressed at different educational levels:

- ◆ Elementary science (WP2): Sustainable development in urban ecosystems; recycling; infectious diseases; heredity and genetic disorders; science and space.
- ◆ Lower secondary education (WP3): Pollution and environmental-friendly policies; sustainable energy use; genomics; waste; climate

change; epigenetics.

- ◆ Upper secondary education (WP4): Biotechnology; bioinformatics; solar energy and green supplies; sustainability; temperature control and regulation; the health effects of statins; cancer genomics; nanotechnology, embryonic cells.

Two first examples are already [online](#) providing a glimpse of the students materials employed during the first TPD series.

TPD courses

Weizmann Teacher Professional Development (TPD) courses description

by Eran Zafrani, Rachel Cohen, & Anat Yarden

Weizmann Institute of Science, Rehovot, Israel; WP4 coordinator

One of the challenges discussed frequently among the WP4 team members is whether to introduce the SSIBL framework explicitly or implicitly during the TPDs that are carried out in the course of the PARRISE project. The WEIZMANN team at the Department of Science Teaching at the Weizmann Institute of Science, developed a model for the PARRISE TPD course in which during the first half of the course (two full days, 16 hours) the four pillars of the SSIBL framework (namely, CE, SSI, RRI, and IBSE) are continuously used but are not mentioned explicitly, while during the second half (2 full days, 16 hours) these four pillars are presented and used explicitly (Figure 1).

This TPD course was planned and conducted through a collaborative effort with a high school in Tel-Aviv, Gimnasya Herzelia, where students are cultivating the edible algae 'Spirulina' as a dietary supplement, aimed for the needs of under-developed countries.

The TPD course was composed of two parts: i) SSIBL implicit, and ii) SSIBL explicit, as follows:

First part of the course: SSIBL implicit (Days 1 and 2, Figure 1)

- ◆ We began our TPD with lectures from experts on complex social issues, followed by a discussion about the role of education in dealing with such issues. With the aim of exposing teachers to the multifaceted nature of socio-scientific issues, teachers subsequently created controversy maps for a topic of their interest. The day ended with a lecture by the Gimnasya Herzelia students, speaking about their project.
- ◆ In the second meeting of the TPD, participants experienced a one-day inquiry activity which permitted them to perform experiments in the context of the students' socio-scientific Spirulina project. The activity culminated in a discussion regarding the impact of such projects on school science education.

Second part of the course: SSIBL explicit (Days 3 and 4, Figure 1)

- ◆ On the third day of our TPD we introduced participants to the practical and theoretical elements of SSIBL. We began with a presentation about the PARRISE project and the SSIBL framework, including the four pillars and how they

relate to each other. This marks the first time the teachers were provided with explicit details in relation to the theoretical thinking behind the PARRISE project. Later, a comprehensive and practical presentation about the SSIBL projects in Porto University was given by one of the WP4 team partners, Dr. Maria João Fonseca. By the end of the third meeting teachers were asked to prepare their own SSIBL project to be implemented in their classrooms.

- ◆ We ended the TPD on the fourth day, at which the teachers presented their planned projects, with subsequent reflection and discussion sessions.

The implicit exposure of the teachers to the four pillars of SSIBL during the first two days of the TPD enabled them to experience SSIBL themselves as learners (teachers as learners). On the other hand, the explicit exposure to SSIBL during the 3rd and 4th day of the TPD enabled them to develop learning materials for their students (teachers as curriculum developers).

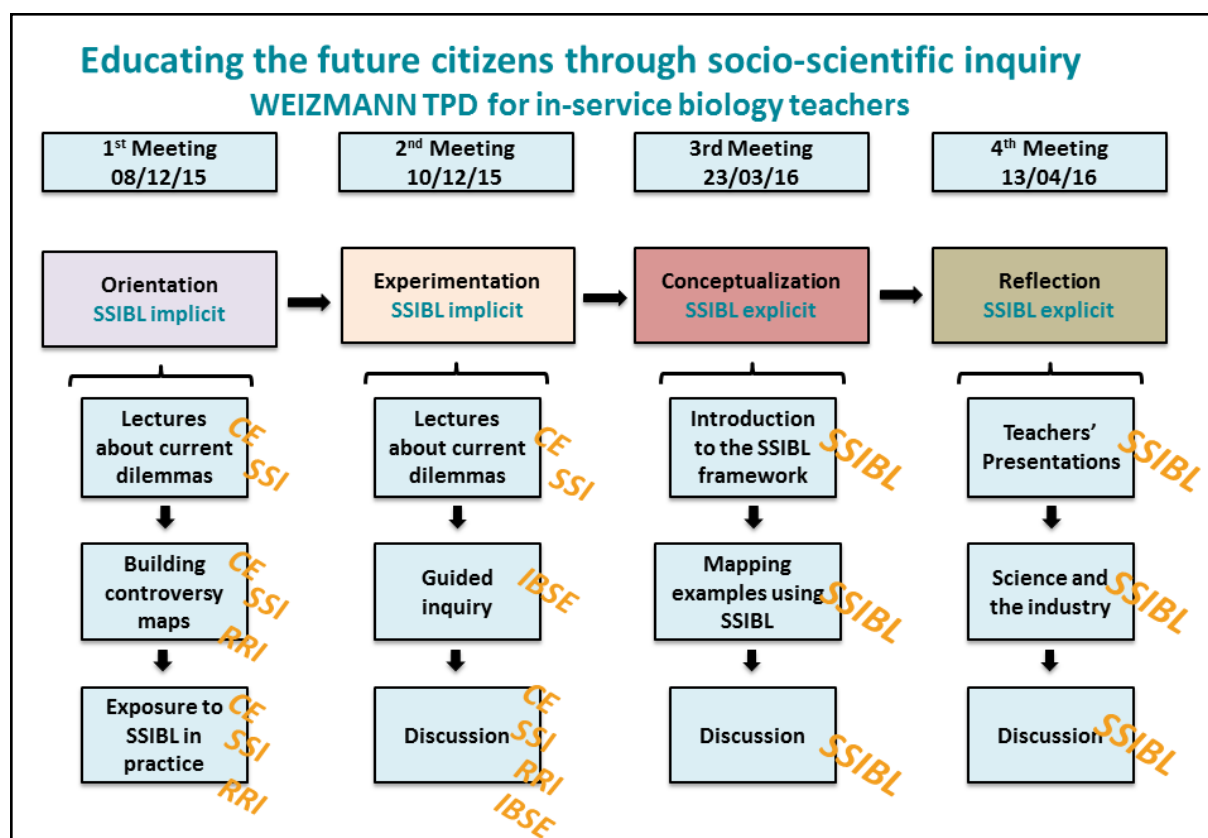


Figure 1. Educating the future citizens through socio-scientific inquiry—WEIZMANN TPD for in-service biology teachers.

The Cyprus Teacher Professional Development 2015-16

by Eleni A. Kyza, Yiannis Georgiou, Andreas Hadjichambis, Andria Agesilaou
Cyprus University of Technology (CUT), Limassol, Cyprus

The review of the literature, and our own research-based conclusions from previous professional development projects (PROFILES, CoReflect) all point to the need to engage teachers in extended professional development experiences (Loucks-Horsley, Stiles, Mundry, Love, & Hewson, 2010). Change is slow, especially when dealing with innovative approaches, such as SSIBL, and the desire to bring about reform in actual practice. The PARRISE Cyprus approach sought to not only inform teachers of SSIBL and help them gain a deeper understanding of the SSIBL framework, but wished to go a step further to supporting teachers in designing problem-based SSIBL modules that address all SSIBL pillars, and test them at their schools with their students.

Therefore, we recruited in-service teachers from elementary, lower secondary and upper secondary classrooms, from the disciplines of biology, chemistry and elementary science. Since the TPD took place during the teachers' own time, and given the multiple demands on teachers' schedules, we opted for a blended approach to professional development that combined face-to-face

(f2f) and online professional development meetings. The approach is shown in Figure 1. Forty-one teachers participated in the TPD course between October 2015 and June 2016. Teachers formed eight collaborative design (co-design) teams, each led by a teacher educator; in total, there were two biology co-design groups (lower secondary, upper secondary), three chemistry co-design groups (one lower, two upper secondary) and three elementary science co-design groups.

The TPD approach combined experiential learning, occurring during five face-to-face meetings, co-design meetings (most often taking place online during the evenings), and continuous reflection activities. Four main aspects of the TPD served as the main mechanisms for supporting TPD processes: experiential learning, co-design, the opportunity to enact and assess the effectiveness of the SSIBL implementations, and continuous opportunities for reflection. Reflection was a key aspect of the TPD and was fostered through teacher educator scaffolding, peer feedback, feedback between interdisciplinary groups, the co-design process and the opportunity to

enact, evaluate and reflect on the SSIBL framework.

The experiential activities were based on a constructivist approach to learning, and engaged teachers in an inductive exploration of the need and meaning of the SSIBL pillars (inquiry-based science education, socio-scientific issues, citizenship education) and how they relate to the grand ideas of Responsible Research and Innovation (RRI). Meeting 1 focused on discussing the nature of science and its role, especially on controversial socio-scientific issues, in addressing societal needs. The teachers were introduced to the idea of Grand Challenges and the need to discuss the role that science education can play. In the main experiential activity, the teachers assumed the role of students and engaged with a problem-solving online learning environment on the use of [antibiotics in livestock](#). Through this situation, teachers were implicitly exposed to issues of socio-scientific controversy and the notion of responsible research, innovation and active citizenship.

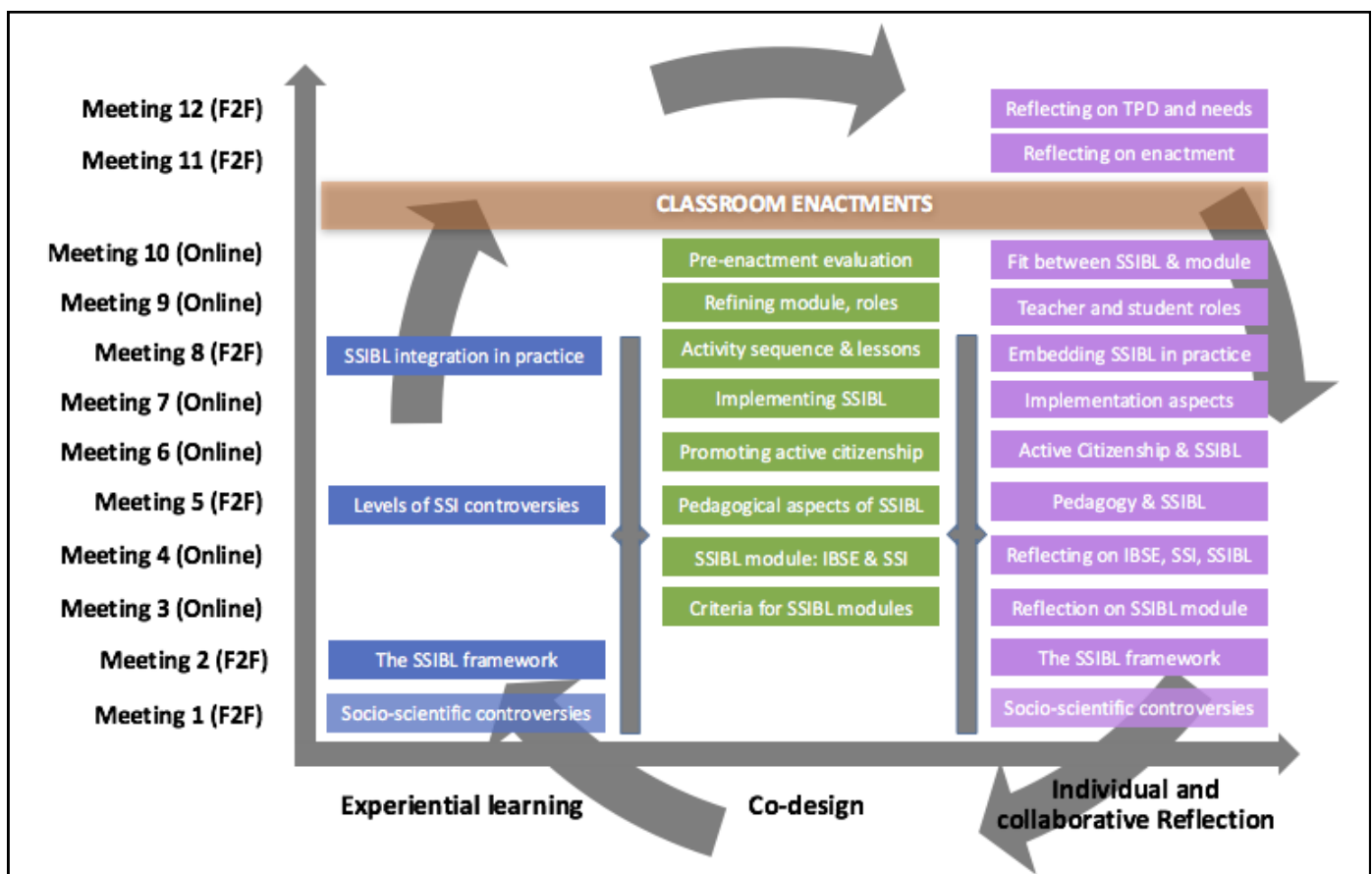


Figure 1. The structure of the Cyprus TPD model (2015-16).

The next meeting, which was again a face-to-face meeting, introduced teachers to the SSIBL framework explicitly, but without defining the pillars of IBSE, socio-scientific controversies, citizenship education and how they all contribute to RRI. Rather, teachers were guided to research online, collaborate, discuss and reflect, to make sense of the terms on their own. In addition, Meeting 2 marked the formation of the disciplinary co-design groups, which were asked to identify curriculum areas which could then be modified or extended to integrate the aspects emphasized by the SSIBL framework. These groups collaborated until the end of the course to create and enact these PARRISE modules.

Co-design is an important tenet of situated learning during in-service teacher professional development (Kyza & Georgiou, 2014; Kyza & Nicolaidou, 2016). The co-design groups met online for 90-120 minutes each time on eight occasions between November 2015 and March 2016. These meetings supported the co-design, which was also strengthened by email communication and the two face-to-face

meetings (Meeting 5 and Meeting 8). The classroom enactments (implementations) offered the unparalleled opportunity of testing out and refining SSIBL ideas, as the teachers' reflection on the enactments indicated. Based again on our prior experience, we believe that enactments offer invaluable opportunities for situated learning (Kyza & Nicolaidou, 2016).

Figure 2 highlights the iterative and cyclical nature of the Cyprus TPD model, while also emphasizing that through these four aspects of the TPD teachers rotated through all four roles of teachers as: learners, designers, innovators, and reflective practitioners.

Each of the teacher teams co-designed a learning environment which was then implemented in different schools across Cyprus by the co-design team members. These eight SSIBL modules were enacted in 25 schools and 28 classrooms; they were taught by 26 teachers and 476 students who participated in these enactments. Preliminary analyses indicate positive results in terms of students' perceptions of active citizenship and motivation to engage with

SSIBL and PARRISE ideas. More analyses are underway and will be shared soon with the PARRISE community.

References

Kyza, E. A. & Georgiou, Y. (2014). Developing in-service science teachers' ownership of the PROFILES pedagogical framework through a technology-supported participatory design approach to professional development. *Science Education International*, 25(2), 55-77.

Kyza, E. A., & Nicolaidou, I. (2016). Co-designing reform-based online inquiry learning environments as a situated approach to teachers' professional development. *CoDesign*, 1-26. doi:10.1080/15710882.2016.1209528

Loucks-Horsley, S., Stiles, K. E., Mundry, S., Love, N., & Hewson, P. W. (2010). *Designing professional development for teachers of science and mathematics* (3rd ed.). Thousand Oaks, CA: Corwin

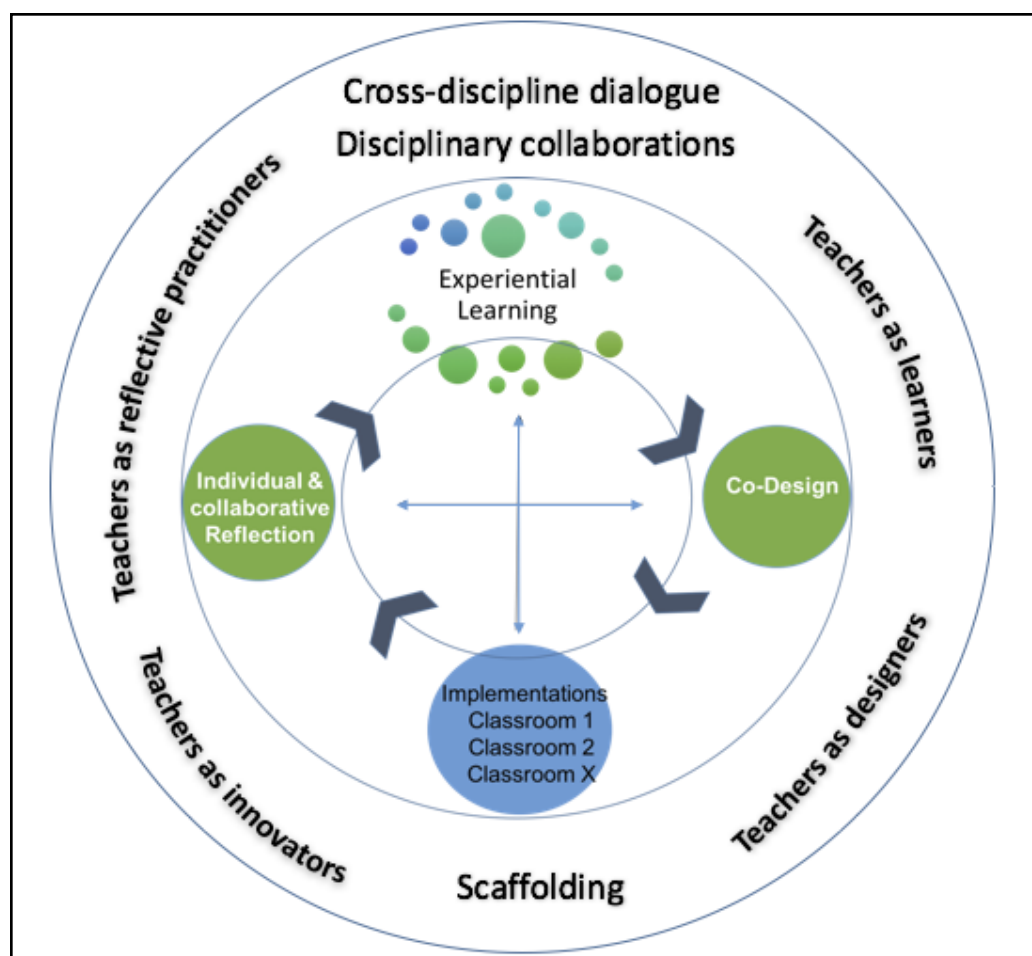


Figure 2. The cyclical and iterative nature of the Cyprus TPD model (2015-16).

PARRISE Teacher Professional Development (TPD) programmes in Estonia

by Jana Paju

Energy Discovery Centre, Estonia

During the spring semester of 2016, the Energy Discovery Centre (EDC) carried out two TPD programmes, with the first one conducted based on a previous collaboration with Tallinn University.

During the "Experiential Learning in Open Environment" course, the framework of the PARRISE project was introduced to the in- and pre-service teachers who had enrolled in the course. As the course already focused on experiential learning, the addition of PARRISE approach was appropriate. The university students (pre-service teachers) had to develop learning scenarios that can be used for teaching primary school pupils. The scenarios consisted of three parts:

1) pre-activities, which will help teachers to prepare the pupils for activities in an

open learning environment (i.e. at EDC); 2) activities which are carried out in the EDC; 3) post-activities that can be carried away from the EDC, in the classroom or at home. The teachers were asked to create scenarios in a way that pupils' attention would also be turned to socio-scientific issues and controversy.

The second programme targeted in-service teachers. The participants spent a lovely day in EDC during May. The one-day programme was intense and consisted of a lecture about the PARRISE approach, a guided tour of EDC, and time at the centre to allow the teachers to have their own unique learning experience in the open learning environment. Afterwards teachers participated in a workshop on creating



Figure 3. A student from Tallinn University is testing the applicability of a worksheet that was created by her peers during the TPD course at the EDC.



Figure 1. Kertu Saks, the director of EDC, is introducing the PARRISE project and the framework.



Figure 2. In- and pre-service teachers from the first TPD course are touring the EDC.

the study scenarios as a group. The concept of the scenarios was the same as for the pre-service teachers.

Although the time allocated to the workshop was limited, the teachers managed to develop their scenarios – all of the groups came up with a unique topic and managed to create their own sets of activities. The teachers loved the approach and the opportunity to develop a scenario that can be used in EDC in the future either by their colleagues or by themselves.

As an unexpected outcome many of the participating teachers wanted to develop their ideas further and share the scenarios. Because of their high motivation we offered them the opportunity to finish the scenarios as a post-activity of the programme. This work is currently in progress. All the materials created will be made available to Estonian teachers via EDC's homepage. By doing so we intend to develop a community of teachers sharing their knowledge and best practices of carrying out a lesson in the centre. People from the centre will also be advising the teachers during the process. This is necessary as learning in an open learning environment tends to differ from learning in a classroom. Therefore, the differences need to be considered during every step of the preparation of the lessons or learning scenarios.

As an outcome of the PARRISE project and the TPD courses so far, we have reconsidered our concept of teacher briefing days. As the teachers still consider science centres, museums, etc. the destination of a field trip, instead of an alternative learning environment, they need to be encouraged to take more control over the lessons they can carry out in such environments. This can be done by helping them to professionally develop during the briefing days by using the aforementioned format.

Using such an approach could prove itself useful in the long run. By helping teachers with their smooth start in the beginning of their journey in the world of experiential learning and all the aspects that the PARRISE approach holds dear, we will hopefully change the landscape of learning in Estonia teacher by teacher.

Teacher Professional Development (TPD) course at Nijmegen (Netherlands)

by Sanne Dekker & Inge van der Aa
Radboud University, Nijmegen, The Netherlands

In February 2016, our Teacher Professional Development (TPD) program for primary school teachers started with a group of thirteen in-service teachers. The course consisted of five 2.5 hour-sessions spread out over ten weeks. During the course, the teachers were introduced to the PARRISE project, the SSIBL framework and the phases of inquiry-based learning. All activities were centered around the theme 'Thinking about DNA'. The teachers discussed different socio-scientific issues and controversies about DNA. By using concept cartoons, mindmaps and the activity 'motional arguing', teachers were acquainted with a variety of

methods to map the different viewpoints of the stakeholders involved in the controversy. Also, teachers learned how to implement a 7-step model of inquiry-based learning to research socio-scientific issues. The evaluation of the course showed that the in-service teachers highly valued the different tools that they could use to develop their own SSIBL project in the classroom. The participants particularly valued the SSIBL machine, which we consider one of the good practices of our course. Next plans included visiting the classrooms to see how the teachers implement the SSIBL framework in their practice.



Figure 1. Teachers developing activities for classroom use.

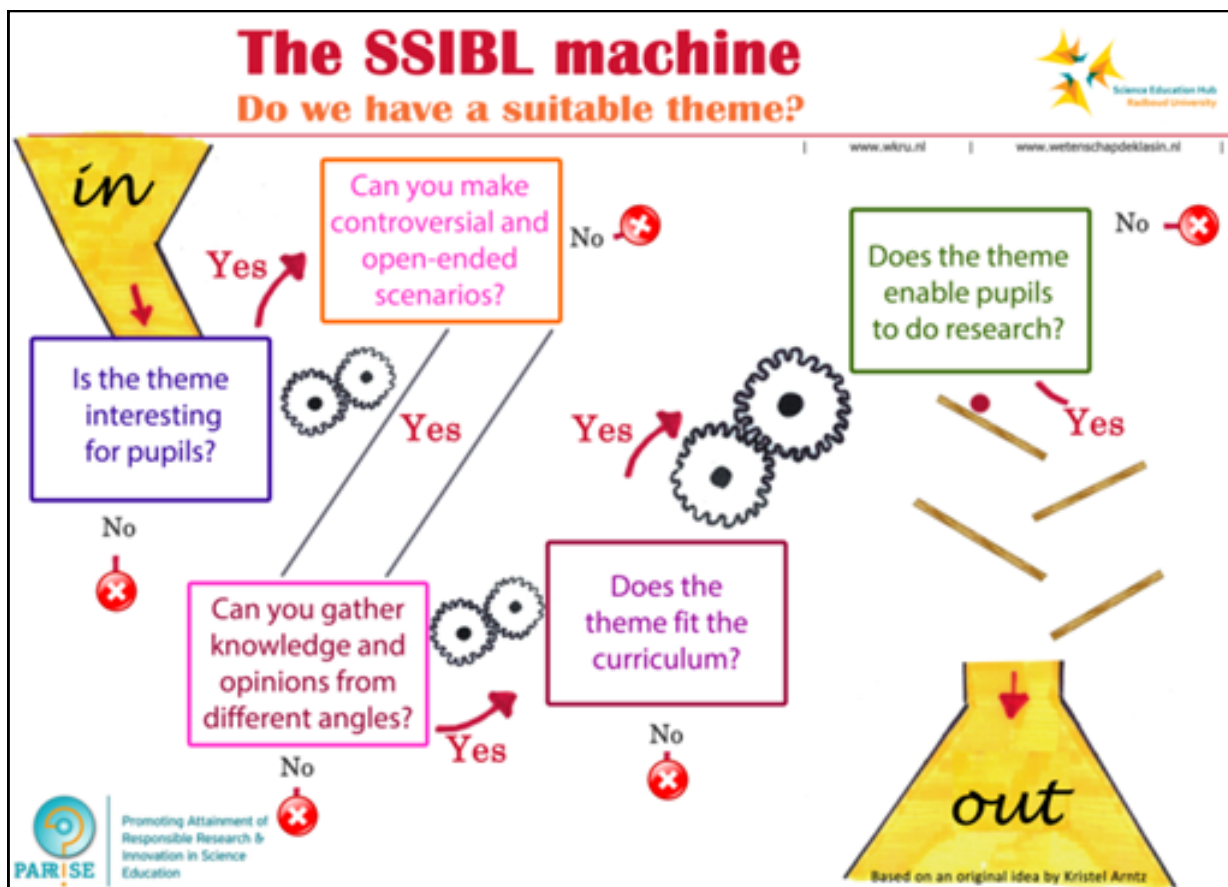


Figure 2. The SSIBL machine, developed by and for teachers.

Implementing the *démarche d'enquête* as an open inquiry process about socio-scientific issues

by Jean Simonneaux, Laurence Simonneaux, Lucas Nedelec, Grégoire Molinatti
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How to explore in classroom a question that has potentially several answers? How to investigate socio-scientific topic based on different types of rationalities, provided by different types of sources? How to think and organize an educational process about it? How to deal with the uncertainties, the complexity and the acuteness of this topic?

These educational challenges get us to think an inquiry process adapted to socio-scientific issues teaching and consequently to SSIBL activities. Regarding to the specificities of that kind of questions (open-ended, making visible risks and uncertainties, emotional dimension, multidisciplinary, etc.), we differentiated it from the inquiry based-learning science education.

As in inquiry based-learning methods the *démarche d'enquête* also refers to the notion

of experience (Dewey, 1938) but the difference lies in inquiry as an experience lived by the students as an exploration of a continuously unstable environment. In the survey process, the future is more important than the past, the approach is proactive and not retroactive (Ladage & Chevallard, 2011), as in a scientific review. Moreover, the *démarche d'enquête* is a specific approach first by the nature and the structuring of the steps of exploration of the question. In this approach and as it can be seen in its graphical representation, a spiral-learning approach is essential, and the different inquiry stages need to return to the problem regularly. Students have increased responsibility identifying questions and problems and in the choice of the resources to be mobilized. The teacher is responsible for the construction of the pedagogical situation defined here by a

Démarche d'enquête: choosing the terms...

Literally, the French expression *démarche d'enquête* can be translated as "inquiry process". But this translation creates a risk of confusion: the term "inquiry" is already meaningful because it is related to the classical inquiry-based learning model ("investigation" in French). Finally, we chose to keep the terms in French to make it clearer. Moreover, "enquête" also refers to the translation of the Dewey's title book *Logic: The theory of inquiry* (*Logique: la théorie de l'enquête*, in French) which is one of our main inspirations.

variety of devices rather than by the solution. Finally, in this paradigm the process is considered as more important than the result.

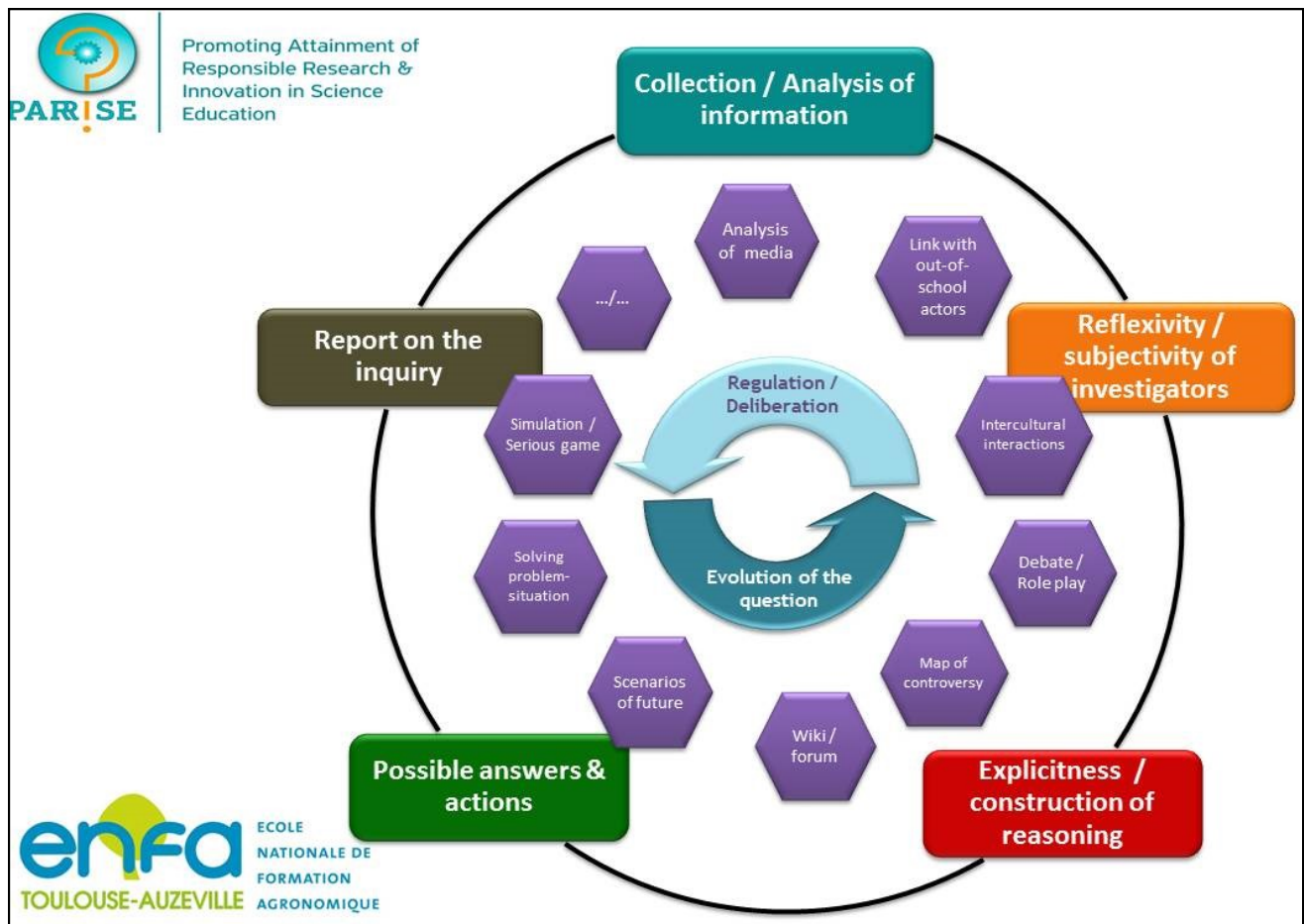


Figure 1. The *Démarche d'enquête*.

We identify five steps (that are in fact items and not chronological steps) in the *démarche d'enquête*:

- ◆ collection and analysis of the information,
- ◆ reflexivity and subjectivity of the investigators,
- ◆ explicitness and construction of reasoning,
- ◆ possible answers and actions,
- ◆ report of the inquiry.

The *démarche d'enquête* can begin with almost each one of these items (except the "report of the inquiry"), or one or several of them can be emphasized during the process considering the aims and the scholar environment of the applied-context inquiry. Inside the circle, we propose some pedagogical devices that can be mobilized during this inquiry. The list of these devices is still open, and every pedagogical tool can be used if it helps to implement the paradigm of this open-ended approach.

The main interest of the *démarche d'enquête* is to permit the autonomy and the flexibility of the teachers and the students during the activity, and at the same time to give to them a coherent guideline and toolbox to organize their exploration. During the first round of SSIBL TPDs in our two institutes, for the first time we proposed to the teachers to implement it. The first feedbacks that we have had since that moment are very positive: the *démarche d'enquête* seems to



Figure 2. At Enfa in May 2016, in-service teachers working in groups from the same agricultural high school institute for the *démarche d'enquête* that they will implement in classroom next year.

be helpful for teachers in socio-scientific issues teaching. The next implementations and first feedbacks from classrooms will continue to build and to ameliorate the approach. Indeed, some educational interrogations are still sensitive challenges for us, for instance concerning the way to manage in classroom the emotional dimension of certain very hot topics or the way that teachers will assess this "*démarche d'enquête*" with respect of the principles of

citizenship (participation, transparency, social justice...).

References:

Dewey, J. (1953). *Logic: The theory of inquiry* (1938). *The later works*, 1–549.
Ladage, C., & Chevillard, Y. (2011). *Enquêter avec l'Internet. Études pour une didactique de l'enquête*. *Éducation & Didactique*, 2(5), 85–115.

Dissemination actions

PARRISE presented at the Open Day of the Carolina Michaëlis Group of Schools

by Christina Dias & Maria João Fonseca
University of Porto, Portugal

Carolina Michaëlis Group of Schools, one of the partner schools in the PARRISE project, held an open day on May 7th, 2016, having as the main goal to disseminate activities developed by the students in various areas of study, such as science, music, dance, painting, etc.

Amongst the various activities presented was the "*Assessment of drug consumption habits in the school community: using *Daphnia magna* as a model organism to evaluate drugs effects*", an activity developed by the teachers of this school who took part in the first round of PARRISE's TPD course in Portugal. During three hours, six students implemented a set of practical procedures aiming to evaluate the toxicity of a selection of substances used by humans in their everyday life, using *Daphnia magna* as a model organism. Likewise, they also presented the main outcomes of a survey

about the consumption habits of some of these substances by the school community carried out by themselves. This event provided opportunities to promote reflection about consumption habits of these drugs and their influence on human health.

During this open day, more than 700 people visited the school and over 300 students took part the implementation of the activities put forth. This was definitely a day which boosted scientific culture, providing the opportunity of the larger school community (including parents, friends and other relatives) to get acquainted with the great work that students engage in at their school.

Read more about the Portugal TPD efforts on the PARRISE website.
(link to: <http://www.parrise.eu/best-practices>)



Figure 1. Evaluation of toxicological effects of drugs on *Daphnia magna*.

RRI and Active Citizenship through teaching science in the context of the PARRISE European project

by Eleni A. Kyza, Yiannis Georgiou, Andria Agesilaou & Andreas Hadjichambis
Cyprus University of Technology, Cyprus

The 1st round of the PARRISE Cyprus TPD program was completed with a national conference entitled "RRI and Active Citizenship through teaching science in the context of the PARRISE European project". The conference took place at the Cyprus University of Technology on June 11th, 2016, from 8.30-13.30. The aim of the conference was to give the opportunity to the different science education stakeholders in Cyprus (e.g. policy-makers, academics, school administrators, science education teachers, parents and students), to learn about the PARRISE project and its philosophy, focusing on the PARRISE Cyprus teacher network activities in 2015-2016, and to participate in a public discussion about Science Education in Cyprus.

A total of 90 stakeholders responded positively to our invitation and attended the 1st national PARRISE conference at Cyprus. The conference started with a greeting from Dr. Eleni A. Kyza, coordinator of the PARRISE Cyprus project, a greeting from Dr. Demetrios Mappouras, Inspector of Biology at the Cyprus Ministry of Education and Culture, and a greeting from Mrs. Chrystalla Koukouma, Inspector of Chemistry at the Cyprus Ministry of Education and Culture.

Next, Dr. Kyza, gave an introductory speech presenting the PARRISE Cyprus project. During her presentation, Dr. Kyza highlighted the goals and philosophy of the PARRISE project, introduced the Socio-scientific Inquiry-based Learning (SSIBL) framework and presented the main actions which were realized during the PARRISE 2015-16 TPD courses.

After that, the local PARRISE 2015-16 teachers presented the SSIBL modules they had developed and implemented, while also sharing their views on this process.

As one teacher participant stated:

'Designing our SSIBL module was real fun. Employing a participatory design process allowed us to interact with other colleagues, to exchange our views and ideas, and to collaborate on developing innovative teaching material for our students.'

Another teacher commented afterwards:

'It was a really interesting experience, as we also had the opportunity to implement the SSIBL module within our science classrooms. This allowed us to integrate the SSIBL framework into our teaching practice.'

In addition, 16 posters, prepared by the participating students and teachers, were posted outside the auditorium throughout the event allowing attendees to learn more about the classroom implementations and giving the opportunity to PARRISE teachers and students to present their work to everyone during the breaks.

As reported during the poster session by one student:

'With our participation in the PARRISE project we have learned how to act as future citizens. In particular, we learned to be active citizens and to look out for the most sustainable solutions.'

On the same note, according to another student:

'The topic we have investigated was very interesting. We have realized that as

responsible citizens it is important to shape our personal views about the different socio-scientific controversies, so that we can create a better future for us and for the future generations.'

The programme continued with a presentation by Mr. Yiannis Georgiou, Research Associate of PARRISE Cyprus; the presentation focused on the evaluation of the SSIBL implementations. During the presentation, Mr. Georgiou highlighted the effectiveness of the SSIBL-based implementations in terms of promoting students' motivation, scientific thinking and active citizenship.

The conference concluded with a discussion about the goals of science education in Cyprus, including the main problems and challenges encountered in the local educational system.



Figure 1. PARRISE Chemistry teachers presenting their poster.



Figure 2. PARRISE high school students presenting their poster.

Students, limnologists, biology teachers and teacher educators meet at the Mini Congress “The Danube River – conflicts over use”

by Christine Heidinger

University of Vienna, Austria

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 form or another on the topic “conflicts over use at rivers” for the last semester and now was the time to exchange insights and approaches around the shared topic.

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 PARRISE: A TPD course for in-service teachers and one for pre-service teachers, between the University of Vienna and another TPD course for pre-service teachers at the Pedagogical University in Lower Austria.

The congress began with a **keynote** from 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-year-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 harbor 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 they finally came up with a compromise which satisfies the needs of the Danube ecosystem, as well as the requirements of the shipping industry.

In the second part of the congress a **poster session** was staged. Novice teachers presented their teaching approaches on 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 of Vienna and at the Pedagogical University in Lower Austria. 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 topic 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. Students from one of these classes, 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 1. Limnologist Fritz Schiemer gave an introduction into conflicts over use around the Vienna Danube.



Figure 2. 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 conclusion of the event, a discussant from each participant group was invited to share his/her 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 PARRISE project 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 statements. 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 brought an intense semester of joint hard work to a close.



Figure 3. At the poster session novice teachers presented their teaching approaches around the topic "The Danube River- conflicts of use".



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

Mobility, traffic and renewable energy

by Diana Radmann, Bernhard Schmözler & Franz Rauch
Klagenfurt University, Austria

Our PARRISE project, "Mobility, traffic and renewable energy", is a joint project between the Alpen-Adria University Klagenfurt and the Center for Didactics of Natural Sciences/University of Teacher Education in Carinthia. The project is embedded in the regional "Climate Schools" programme and is funded by the Climate and Energy Fund of the Austrian government, which focuses on climate issues. The following institutions and people participate in the project: 15 pre-service science teachers from the University of Teacher Education in Carinthia; three model regions in Carinthia: "Energy Paradise Vally of Lavant", "Terra amicitiae Arnoldstein", "Region South Carinthia", each managed by a climate region manager; 10 schools, 20 in-service science teachers and about 250 students in the Climate model regions, and 10 pre-service students from the Alpen-Adria University. During the summer term of 2016 many events and workshops, organised by in-service teachers of the Climate Schools together with pre-service teachers of the TPD "Mobility traffic and renewable energy" of the University of Teacher Education Carinthia and climate region managers, took part in the three model regions in Carinthia: Climate Workshop, "Solar Day", participation in "The Long Night of Research 2016".

The "Long Night of Research 2016"

The "Long Night of Research" took place on 22 April 2016. The "Long Night of Research" is one of the largest popular science events in Austria. More than 160.000 people visited this event. In the context of the "Long Night of Research", pre-service teachers of our TPD module presented their projects which addressed the topic "Mobility, traffic and renewable energy" at schools in Climate model regions in Carinthia

(<http://www.klimaschulen.at>). Moreover, they developed a learning circle with hands-on experiments at the Center for Didactics of Natural Sciences of the University of Teacher Education Carinthia. The aim was to attract curiosity and interest for research and natural sciences and especially for the topic of renewable energy. Pupils experienced natural science in a playful manner and tried out the role of

researcher, while pre-service teachers had the possibility to test the knowledge obtained through their studies and their pedagogical and methodological skills. Among 90 research stations, which were presented in Klagenfurt during the "Long Night of Research", the contribution of the pre-service teachers of the University of Teacher Education Carinthia was ranked first among the visitors.



Figure 1. Pre-service teachers developed an experiment-based learning circle for pupils. Pupils could try out the role of a researcher.



Figure 2. Pupils and their parents experimenting with great enthusiasm. In the background pre- and in-service teachers.



Figure 3. Pupils and a teacher educator of the University of Teacher Education Carinthia during an experiment.

Climate Workshop "Solar Day" on 4 May 2016

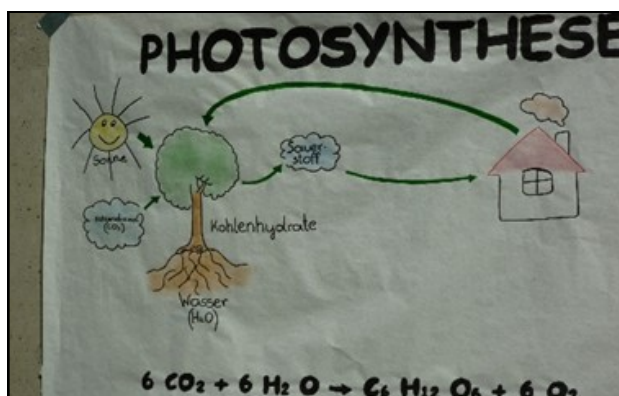


Figure 4. A poster made by students during the workshop illustrates the photosynthesis.

In the Climate model region Terra Amicitiae Arnoldstein a "Solar Day" workshop was organised by in-service teachers of climate schools together with pre-service teachers of the TPD "Mobility traffic and renewable energy" of the University of Teacher Education Carinthia and climate region manager. The following schools were involved: New Secondary School (NMS) Arnoldstein; Secondary School for Economic Professions (HLW) St. Peter; Agricultural Technical School (LFS) Stiegerhof. About 110 pupils took part in the climate and energy issues. Topics like photosynthesis, CO₂ and the climate,

and the energy consumption in Austria, were elaborated with the students by using many practical examples. The students had to master an obstacle course by e-bike or segway, to convert the consumption of fossil fuels like oil in renewable energies like wood chips, etc. The students also participated enthusiastically in an energy quiz on energy efficiency, environmental, mobility and climate protection topics. At the end of the "Solar Day" workshop, healthy, home-made snacks offered by the Agricultural Technical School Stiegerhof completed an informative and exciting day.

Really working scientifically!

by Ruth Amos & Andri Christodoulou

UCL Institute of Education & University of Southampton, UK

On 8th January 2016 we facilitated a workshop at the ASE 2016 national conference organised at the University of Birmingham. The aim of the session was to share some of our initial ideas and strategies on how the SSIBL framework could be used in secondary science classrooms, under the 'Working Scientifically' tenet of the National Curriculum for England and Wales. More specifically, the objectives of the session were for the participants to:

- ◆ consider how they can foster open, enquiry-based science thinking and doing when *Working Scientifically* with their pupils
- ◆ develop skills in encouraging pupils to ask authentic questions, identifying researchable questions and planning strategies for pursuing inquiries which matter to *their pupils*
- ◆ use scenarios and resources on climate change and drugs testing on animals to show how socio-scientific issues, citizenship and responsible research approaches can be taught through inquiry learning in science

We had 36 delegates participating in the session, consisting of 23 pre-service teachers, five in-service teachers, seven science teacher educators and one masters' student, coming from 24 different institutions and organisations in the UK and internationally (2 schools in Belgium and a higher education institution in South Korea).

The 2-hour workshop consisted of two parts. The first part focused on ways of raising authentic, curiosity questions in science classrooms based on the 'Kinder Egg' activity. Participants were given a 'mystery box' containing a Kinder egg and various photographs of environmental scenes, and were asked to work in groups of 4-5 and to think about questions they could ask in relation to the objects in their box (Figure 1).

Participants asked questions in relation to a range of topics (Figure 2). Some focused on the objects in the Kinder Egg to ask questions. For instance, a group that found a toy monkey asked: *What species are you? Where do monkeys live? How are monkeys adapted? What is their habitat?* Other questions asked based on the toys found included: *Why does the toy car move? Does the Kinder Egg float? Was pollution responsible for the extinction of dinosaurs?*

Other groups chose to focus on the materials the Kinder Egg was made of (chocolate, plastic, aluminium) and asked questions such as: *What role do cocoa beans play in the plant? Where does chocolate come from? How do they get the shape and layers of the chocolate? Are the chemicals dangerous? What processes do you have to go*

through to get from cocoa beans to Kinder Egg final product? Some also considered the people involved in the making of this product (design, grow, manufacture) and whether it was based on fair trade and using renewable materials. Finally, some interesting questions were raised in relation to environmental impacts of the manufacturing process such as: *What is the effect of greenhouse gases and CO₂ produced during the manufacturing process? What is the local area impact (herbicides/pesticides) effect on environment etc.? Is there a conflict between conservation and the production of [these] materials? What is the impact of recycling [of these materials]?*

In the follow-up discussion, the range and quality of the questions asked was commented on, as well as the science that could have been taught as a result of asking

these curiosity questions. When prompted to think about further links to 'Science in Society' they could have made, participants also mentioned the cost of manufacturing the objects and materials and questioned the use of plastic. We asked for example: *What can we now do with the plastic 'egg' toy container instead of throwing it away or recycling it?* One participant suggested we could fill it up with coins for giving it to homeless people on the street, an indication that they were starting to think about the implications of using such objects not just from a science perspective but also from a societal, ethical perspective.

The second part of the workshop focused on the use of two teaching scenarios, one on climate change and the second on the use of testing drugs on animals.



Figure 1. Ruth discussing curiosity questions with participants.

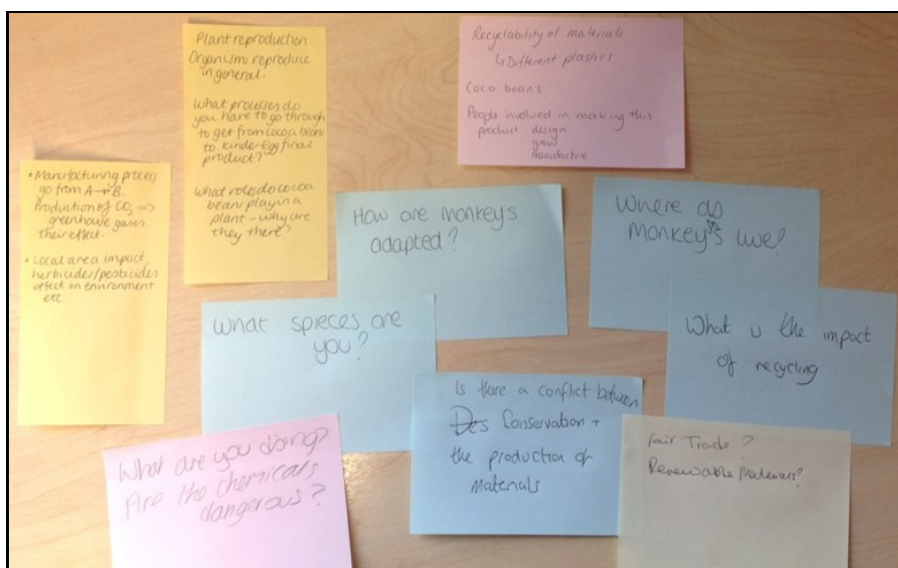


Figure 2. Some of the questions asked by participants during the Kinder egg activity.

During these activities, participants were asked to take a position in relation to each scenario, to explore collaborative evidence for and against each scenario and then reconsider their position (Figures 3 & 4). We also discussed how they could adapt the activities for use in their Keystage 3 & 4 (lower secondary), how they could encourage their pupils to take action, and how they would assess collaborative skills and conceptual understanding during these activities. To facilitate these processes we provided participants with a tool designed by the UCL IOE team suggesting teacher prompts for designing and carrying out 'science for responsible research' inquiry.

Overall, participants engaged with enthusiasm and interest in the workshop and raised some interesting issues about the topics discussed (e.g. the ethical dimensions of drugs testing on animals) and how they could manage such discussions with their pupils (Figure 5). It was also encouraging that all participants provided their contact details for receiving the materials we used during our session and updates about the PARRISE project. One teacher participant stated that she was:

'inspired by your workshop at the ASE conference titled 'Really Working Scientifically'. I would love to use some of your ideas in my classroom'.

A teacher educator commented afterwards:

'It was a really interesting session and a theme I haven't really developed on our course. I would like to include more on this next year so I'd appreciate it if you could send me a link to your slides and any recommended reading'.

We look forward to developing this work further, and receiving feedback on the use of the resources provided to our workshop participants!



Figures 3-4. Participants discussing collaboratively during the two scenario activities.

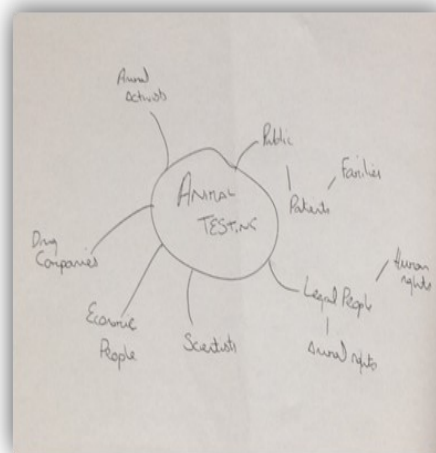


Figure 5. Some of the maps participants created to represent the controversy around testing drugs on animals

Partners' publications

Publication about Eco-reflexive Science Education

Sjöström, J., Eilks, I., & Zuin, V. (2015). Towards eco-reflexive science education. *Science & Education*, 25(3), 321-341.
<http://link.springer.com/article/10.1007/s11191-016-9818-6>.

Publication about SSIBL-based Learning Environments

Kárpáti, A., & Király, A. (2016, June). Creating a socially sensitive learning environment for science education: The SSIBL framework. In: Teixeira, A. M., Szűcs, A., & Mázár, I. (Eds.), *Re-imagining learning scenarios*. Paper presented at the EDEN 2016 Annual Conference, Budapest (pp. 599-608).
http://www.eden-online.org/2016_budapest

Newsletter

PARRISE -Promoting Attainment of Responsible Research & Innovation in Science Education

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SEVENTH FRAMEWORK PROGRAMME

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