The PARRISE project proudly announces its final public conference entitled “Science and society in education”. The conference will take place on Sunday, August 20th, 2017, in Dublin, Ireland, preceding the ESERA 2017 conference.

The conference “Science and Society in Education” is aimed at science teachers and teacher trainers (primary and secondary education), science education researchers, informal science educators, and representatives from government and stakeholder organisations.

The conference will focus on new approaches in introducing social issues in science education, as well as on how teachers stage these approaches in their classroom. In addition it will focus on presenting innovative approaches to teacher professional development.

One of the goals of the conference will be to point out future directions for integrating “Responsible Research and Innovation” in science education, by connecting findings of the PARRISE project with those of other RRI projects funded by the European Commission.

The conference, which will be a one-day event, will feature two panels: the morning panel will focus on PARRISE outcomes, while the afternoon panel will focus on the future and sustainability of the PARRISE efforts. The panel members will represent governmental organisations and public interest groups / industry, representatives of which have a strategic interest in science education. The PARRISE conference will also include poster presentations from teachers who have implemented the PARRISE approach in the classroom, posters by other RRI projects, and parallel workshops on the PARRISE approach.

Participation is free of charge. You can now complete the registration form to pre-subscribe to our final conference, and to receive additional information. We hope to see you there!
Advances in PARRISE Teacher Professional Development (TPD) programmes in Estonia

by Jana Paju & Ave Schmidt
Energy Discovery Centre, Estonia

During autumn 2016, PARRISE-related developments were slow in Estonia, as many changes occurred at the Energy Discovery Centre (EDC) – changes both in structure and in our staff. Nevertheless, as time has passed, things have settled down and we are glad to announce another TPD one-day meeting with teachers at the EDC.

The meeting will focus on implementing the SSIBL framework in the context of experiential learning and formal learning, trying to bridge the two contexts. The participating in-service teachers (elementary school and also upper level STEM) will have the opportunity to participate in a workshop about the development of suitable study materials. In addition to the SSIBL framework and our model of combining the immediate learning activities (at the EDC) with pre- and post-activities, we will also introduce the “SSIBL machine”, that our PARRISE colleagues from the Netherlands have created, to the participants.

The model of three types of activities (Figure 1) helps the students to acquire deeper knowledge. The pre-activities are usually conducted at school, to prepare the students for learning activities at the EDC, in the informal environment. After that, the students engage in post-activities, at their school or at the EDC. These activities provide them with the opportunity to analyze their new knowledge, put it into use and by that gain deeper knowledge of the topic.

The aims of this upcoming meeting are to:
1) Encourage the development of a stronger community of innovative teachers;
2) Introduce the novel methods of SSIBL to this community;
3) Encourage the community to create together;
4) To provide a platform for exchange of created materials on our website.

As this is the second time we are conducting such a meeting with in-service teachers, it is worth mentioning that the previous meeting was a fruitful collaboration with the teachers and that the teachers who participated back then must have been sharing their experience with their peers, as the teachers’ interest has grown. Previously we had approximately 10 participants but this time we had to close the online registration after just two days as we already had 23 registrations for the meeting.

Hopefully we will be able to have more of such meetings in the future!

Figure 1. The model of our approach - teachers create the immediate learning activities (to be used at the EDC) and also pre- and post-activities (to be used at either school or at the EDC) to help the students acquire deeper knowledge of the topic.
Engaging scientists, teachers and students in Responsible Research and Innovation (RRI) at the University of Jaén

by Ana M. Abril, Marta Romero Ariza & Antonio Quesada
University of Jaén, Spain

In line with the PARRISE objective of promoting Responsible Research and Innovation through Science Education, partners at the University of Jaén (Spain) have promoted an initiative called SciencIES, which seeks to engage scientists, teachers and secondary school students in the research and discussion of cutting edge scientific investigations in authentic contexts. Raising students’ interest in scientific careers, and developing a better understanding of scientific research and its implications, are some of the key goals to be achieved though SciencIES.

The SciencIES initiative started in October 2016 and it involves 135 students from 19 different schools in the South of Spain, who started collaboration with 40 researchers from different fields of knowledge at the University of Jaén. For several months students will visit the university regularly and take part in investigations on a wide range of topics, such as cerebral ictus, immortal cells, aquatic ecosystems, neurosciences, applied biomathematics, biostatistics and computational biology, and pollen variability, among others.

The opening and welcome of students and teachers was on December 2, 2016 in a vibrant atmosphere full of excitement and high expectations of what might be. This was an influential experience in these students’ life.

Through engaging in real investigations and discussing socio-scientific issues, students will develop inquiry skills, critical thinking and a better understanding of the cutting edge topics under research in science and their implications. These learning outcomes are not always fully addressed in school contexts, but they are essential for equipping individuals with the knowledge, skills and values to actively participate in Responsible Research and Innovation. From this perspective, SciencIES, in collaboration with PARRISE, is making a significant contribution to bridge the gap between the science being taught at school and the science needed to face current social challenges.
First round of workshops in Malmö completed

by Mats Lundström
Malmö University, Sweden

The first round of teacher professional development workshops is now completed at Malmö University. Sixteen in-service and 13 pre-service teachers were involved. The in-service teachers attended four half-day seminars, at which they discussed SSIBL activities, listened to, and were inspired by researchers. The in-service teachers also designed their own learning modules on a variety of topics, such as nano-technology, energy, weight problems, and infertility, which they, then, implemented with their lower secondary classes (Figure 1).

The nano-technology activities were especially popular among students. In one case, for instance, a class with 15-year old students assumed the role of an ethics committee, asked to decide if nano-technology was important and ethically acceptable (Figure 2).

On the other hand, the pre-service teachers have mainly worked with life cycle analysis where they had to analyze a product’s life cycle, focusing on the materials they were made from, to how these materials can be recycled. During a professional development day, both in-service and pre-service teachers showcased their projects.

During spring 2017, the second round of our TPD courses will take place in a similar way. In some parts of TPD courses, the in-service teachers from lower secondary school will work together with upper-secondary pre-service teachers as during 2016. Twenty in-service teachers have announced they will join the course during 2017. The second round of the TPD courses will start with a lecture by Christina Isaxon, who does research concerning risks with nano-technology. We expect that this introduction will allow for an interesting discussion about responsible research and innovation.
Successful second round of TPD in Nijmegen

by Sanne Dekker & Jan van Baren-Nawrocka
Science Education Hub, Radboud University (SKUN), The Netherlands (WP2)

The Science Education Hub in Nijmegen has completed the second round of the Teacher Professional Development (TPD) programme for in-service teachers. There was a lot of interest from science teachers in the field to participate in this TPD programme. In total, 19 in-service teachers participated in the TPD courses, which lasted for 12.5 hours (five meetings, each lasting 2.5 hours).

Compared to the first round of our TPD programme, we have made substantial changes. These changes were based on our previous experiences, insights from the PARRISE consortium meeting in Vienna, and a feedback session with our pre-service teacher educators. During the second round of our TPD programme, we adopted a model in which the SSIBL framework was implicit in the first meeting, and explicit in the final meeting. Teachers were expected to develop their own SSIBL activities to be implemented in the classroom. These activities were developed throughout the TPD course as different home assignments. Examples of themes developed in our group were the large amounts of plastic in the ocean, robots in the classroom and sustainability/climate change.

Our evaluation consisted of a pre-post questionnaire about attitudes towards SSIBL. Furthermore, we asked the teachers afterwards to report the extent to which they were able to integrate the SSIBL approach in the activities they developed, and which challenges and opportunities they saw. Overall, we received very positive ratings, with an average evaluation score of 6.7 out of 7 possible points. Also, we received requests to provide additional support in the classroom, for instance, coaching on the job. Since this is a service our organization offers, this means SSIBL is finding its way into our organization and contributing to the sustainability of PARRISE after the project’s completion. Furthermore, we have decided to organize a follow-up session in April 2017, to meet again and exchange experiences, ideas and questions. Looking back, we are very satisfied with the changes made compared to the first round of our TPD programme, and we look forward to continue working on integrating inquiry-based learning with citizenship education and socio-scientific issues.

Second Round of PARRISE TPD Course in Portugal

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

Our second round of our Teacher Professional Development (TPD) course began on October 12, 2016 with a group of 11 in-service biology teachers. The TPD course will run until March 2017.

Similarly to the first round of our TPD courses, this second round of our TPD training course was also designed for a total of 25 hours, distributed as follows: 15 hours corresponding to a set of five, face-to-face, classroom meetings and 10 hours of individual, distance learning sessions. At this moment, teachers are preparing their individual projects, which will be implemented in their classes beginning January 2017.

A highlight of this second round of TPD are the classroom interventions of three Carolina Michaëlis Secondary School teachers, who attended the first round of our TPD course and who are now improving the activity they developed last year. This endeavor follows the presentation of their previous SSIBL activity “Assessment of Toxicity of some drugs in Daphnia magna” to the course participants in the second session of the TPD course. This sharing experience was designed with the purpose of empowering the participants to take hold of the educational opportunities naturally occurring in their common practices. Furthermore, it makes participants feel comfortable with the development or adaptation of activities according to the SSIBL framework.
The ethical and scientific dimensions of contemporary socio-scientific issues

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

During the 2nd round of the PARRISE Cyprus TPD programme, an effort was made to engage teachers with practicing scientists and stakeholders. As part of this effort, during the 3rd face-to-face meeting of the PARRISE teachers, we organized a public event entitled "The ethical and scientific dimensions of contemporary socio-scientific issues".

The event took place at the Cyprus University of Technology, on December 17, 2016, from 8:30-13:30. It was attended by 45 participants; the audience included PARRISE Cyprus teachers and other stakeholders (e.g. academics, non-PARRISE teachers, university students, etc.) who were interested to find out more about the topic of the event. During the event, a panel consisting of a nephrologist (Dr. Loucas Damianou), a chemist from the Department of Labour Inspection (Dr. Tasoula Kyprianidou-Leontidou), and the President of the National Committee on Environment and Children’s Health (Dr. Stella Kanna-Michaelidou) gave presentations. Each speaker was invited to discuss the ethical and scientific dimensions of the contemporary socio-scientific issues of his or her own scientific field.

The event started with a welcoming note from Dr. Eleni A. Kyza, scientific coordinator of the PARRISE Cyprus effort, who briefly explained the PARRISE project to the participants. Subsequently, each invited speaker delivered a fifteen-minute presentation. Dr. Kanna-Michaelidou spoke about the ethical dilemmas in the management of wireless communications, such as mobile phones and wi-fi. Dr. Kyprianidou-Leontidou discussed the use of nano-materials in our lives. Finally, Dr. Damianou explained the debate and ethics of human organ transplantations. Each presentation was followed by a fifteen-minute discussion, during which the audience had the opportunity to pose questions, and ask for further information or clarifications.

The event continued with a panel discussion, which was coordinated by Dr. Eleni A. Kyza. During the panel discussion the invited speakers were asked to discuss (a) the main controversies which arise with the scientific and technological development in their field, and (b) provide their opinion on whether it is possible for citizens to meaningfully participate in decision making relating to these controversial socio-scientific issues. The audience had more opportunities to interact with the invited speakers by asking additional questions. The event concluded with a clear message towards the PARRISE science teachers: the need to develop active citizens equipped with critical thinking, able to participate in democratic decision-making on contemporary socio-scientific issues.

Figure 1. Dr. Kyza introducing the PARRISE project and its philosophy

Figure 2. Dr. Kyprianidou-Leontidou discussing the use of nano-materials in our lives

Figure 3. Dr. Damianou explains the debate and ethics of human organ transplantation

Figure 4. Dr. Kanna-Michaelidou spoke about the ethical dilemmas in the management of wireless communications
PARRISE summer 2016 events in Israel

by Rachel Cohen, Eran Zafrani, & Anat Yarden
Weizmann Institute of Science, Rehovot, Israel; PARRISE WP4 team

The 1st round of the PARRISE Teacher Professional Development (TPD) programme in Israel was introduced to teachers at the 22nd National Conference of Biology Teachers, which took place at the Weizmann Institute of Science on June 23rd, 2016 via a presentation entitled: “Inquiry and civilian responsibility - how to combine them together?”

The PARRISE TPD programme in Israel was also presented at a Biology Teachers’ Seminar which was organized by the National Biology Teachers’ Center at the Weizmann Institute of Science on June 28th, 2016 (Figures 1 & 2). The aim of the conference and seminar sessions, which was attended by 100 people, was to give the opportunity to biology teachers in Israel to learn about the PARRISE project and its philosophy, focusing on the PARRISE activities in Israel during 2015-2016, and to engage them in an open discussion about science education in Israel.

In our presentation, we introduced SSIBL as the guiding framework of PARRISE and focused on three aspects: students’ questions, students’ inquiry and students’ implementation of activism (Figure 3). In addition, we presented two SSIBL modules that the local PARRISE 2016 teachers had developed and implemented. Finally, we demonstrated and outlined a new module promoting defibrillator devices for resuscitation in public places, following the true case of Meni Levi—an Israeli football player who collapsed during a game and suffered severe injuries.

We also met with Mrs. Irit Sadeh, Chief Inspector of High School Biology Education at the Israeli Ministry of Education, and Mrs. Sara Zawi, Chief Inspector of Environmental Science Education at the Israeli Ministry of Education, to explain the Israeli PARRISE project.

During the presentation, we highlighted the goals and philosophy of the PARRISE project, introduced the SSIBL framework and presented the main actions which were realized during the PARRISE 2016 TPD courses. Together with the two chief inspectors we are planning and conducting a new TPD course for PARRISE 2017 in Israel.

Figure 1. The 22nd National Conference of Biology Teachers in Israel

Figure 2. Presenting the SSIBL pillars

Figure 3. The three stages that were presented to Israeli teachers
The 11th Conference of the European Researchers in Didactics of Biology (ERIDOB 2016) took place in Karlstad, Sweden between September 5th to September 9th, 2016. The ERIDOB conference serves as an important milestone in the European biology education community, providing biology educators and biology education researchers with the opportunity to present their work and learn from biology education efforts around Europe.

PARRISE was well represented at the ERIDOB 2016 conference, through oral and poster paper presentations, as well as a symposium presentation. The symposium entitled “Socio-scientific based inquiry in the context of biology teaching” was organized and chaired by the workpage leader of WP1 of the PARRISE project, Dr. Ralph Levinson (UCL Institute of Education). The symposium focused on the experiences of five PARRISE partners (UCL Institute of Education, University of Southampton, Utrecht University, Ecole Nationale de Formation Agronomique, University of Montpellier) with the Socio-Scientific Inquiry-Based learning (SSIBL) pedagogical framework. In particular, the presentations of the symposium aimed at introducing and distinguishing the SSIBL framework from the classical inquiry-based learning method, as well as at discussing the experiences and challenges of science teachers when employing the framework.

The following presentations were given at the ERIDOB 2016 conference.

- **Symposium**
  - Christodoulou, A., Amos, R., & Grace, M. (2016). Pre-service teachers’ experiences of learning to teach biology through a Socio-Scientific Inquiry-Based Learning (SSIBL) approach. [Paper 3]

- **Individual oral presentation**

- **Poster**

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**Responsible Research & Innovation (RRI) Festival in Cyprus**

The University of Nicosia (Engage), the Cyprus University of Technology (PARRISE), and the University of Cyprus (Ark of Inquiry) are co-organizing an event on “Responsible Research and Innovation” (RRI), as this is exemplified through the European RRI projects they lead in Cyprus. The focus of the event will be on how RRI can be integrated in science education practices at all educational levels.

The event will take place on Saturday, March 11th, from 9:00-13:00, at the University of Nicosia.

The event aims at discussing the ways through which students’ everyday lives may be connected to science, how students’ motivation for learning science can be increased, and how the social aspects of science can be addressed in science education lessons. The event will include presentations by researchers and practicing science teachers, who have implemented educational activities, developed in the context of the three European projects, in their classrooms.
When we are about to buy fruits or vegetables at the supermarket we surely want to choose what’s best. Do we know what’s best for us and how these fruits and vegetables end up in our homes? We buy them to be fed, but what feeds them? A variety of fertilizers, chemical or organic, are responsible for the quality of the products we buy.

When the primary education teachers (Alexia Alexandrou, Andromachi Mathaiou, Michalis Michael & Anthi Papaiopannou) participating in the PARRISE Cyprus TPD course 2015-16 were asked to develop a module about environmental responsibility through the Socio-Scientific Inquiry-Based Learning (SSIBL) approach, they chose the debate between chemical and organic fertilizers. Which option is better for a healthy, tasty and profitable production without harming the soil and the environment? Chemical fertilizers, organic fertilizers, compost, or manure?

The learning module “Which fertilizer would you choose for your onions?” is suitable for students aged 11-12, and was developed aiming to help students become familiar with the procedure of growing vegetables and the concepts of eutrophication and soil pollution. In addition, and in line with the emphasis on Responsible Research and Innovation, an important goal of the learning module was to enhance students’ active citizenship for matters that affect us and our environment.

The learning module, which was developed by four in-service primary school PARRISE teachers during the first TPD round in 2015-16, was submitted to the 4th Pancyprian Competition "Science on Stage Cyprus", which was held on the 12th of November 2016. The contest is dedicated to STEM education and is addressed to K-12 Educators. The learning module won the 4th prize and will represent Cyprus to the European Festival Science on Stage 2017, which will take place in Debrecen, Hungary. “Science on Stage Europe” is the largest festival for science education teachers at the primary and secondary school level.

The aim is to provide participating teachers with the chance to exchange ideas, educational practices and innovative teaching concepts.
The international conference “Teaching Physics Innovatively” (TPI-15) was organized in August 2015 at Eötvös University (ELTE) in Budapest, and focused on how to teach physics innovatively in secondary education. The conference included plenary presentations, paper sessions and a panel discussion about recent challenges in physics education. The conference was attended by more than 100 participants from 18 countries, and focused on the encounter of teachers and scientists, mediators and promoters of Physics, to support the joint building of bridges between researchers and society. The conference was organized in association with the PARRISE project and placed special emphasis on the pedagogical interpretation of socially relevant issues in science education.

We are happy to announce that the proceedings of this conference (publisher: Graduate School for Physics, ELTE University, Budapest, editors: A. Király and T. Tél) are available now as an e-book, and can be downloaded from the ELTE PARRISE website (http://parrise.elte.hu/tpi-15/proceedings.php). The conference proceedings cover a wide variety of thematic areas, such as:

- Inquiry Based Science Education
- Science centres and other informal learning opportunities
- Environmental issues
- Our cosmic environment
- Socially sensitive issues
- Multimedia and ICT
- Physics experiments and methodological innovations
- Contemporary physics
- Nuclear issues and
- Roundtable discussions about socially sensitive issues in physics education.

A written version of the roundtable discussion on socially sensitive issues in physics education was a special highlight in the conference proceedings, along with a description of the visit of the conference participants to the only nuclear power plant in the country at Paks Nuclear Power Plant. Other interesting features, related to socially sensitive issues, include a report about the scientific programme at the summer camp “Bátor Tábor”, a camp organized for seriously ill or handicapped school kids, and an article discussing the physics of colour blindness or colour deficiency, and the difficulties these imply for students and teachers.

Among the environment related contributions, one can find papers on: light pollution measurements for secondary school as project work; the investigation of energy consumption at a Budapest high school; and on the experimental examination of photocells and photosynthesis. The contributions describing the role of science centres, science events and full day experimental programmes to the motivation of students and to promoting physics, are also of special interest.

One can access the individual papers and presentations on the ELTE PARRISE webpage (http://parrise.elte.hu/tpi-15/slides.php). A “forum” was also associated to each paper. The final version of the Conference Proceedings will be available soon as a printed book.
Millions of people around the world are at substantial risk for heart attack and stroke due to severe cholesterol problems. This brings the question of finding an efficient way to control cholesterol to the forefront. In this context, many experts agree that statins are beneficial for people at substantial risk for heart disease. On the other hand, some medical researchers claim that statins do little or no good and may cause possible harm to people with lower risk of heart disease. The conflict has burst into a vicious debate over cholesterol drugs dividing the public opinion.

When the biology education teachers participating in the PARRISE Cyprus TPD courses 2015-16 were asked to develop a SSIBL module, they chose to focus on this debate which was reframed through the guiding question “How to control your cholesterol: through statins or through exercise and balanced diet?”. The learning module, which was developed by seven in-service biology school teachers, received excellent reviews by the Biology Education Inspection and, as a result, it was also integrated in the Cyprus national biology curriculum.

The SSIBL module was addressed to 11th graders and was taught during three lessons, 80 minutes each. Students were introduced to the learning module through a pedagogical scenario presenting a young teenager that finds out that his father just had a heart attack. In this context the young teenager is asked help his father decide how to control his cholesterol, and also prevent the problem for arising from him. As part of the pedagogical scenario, the students are asked to help this teenager to reach an evidence-based decision and inform their families and schoolmates on this topic. The learning module targets the three following dimensions:

a) Socio-scientific issues: Students are asked to study several sources (e.g. medical articles, patients’ interviews, dieticians’ posts and flyers) as well as physical trainers’ views. In this way, they can understand the complexity of the specific socio-scientific issue as well as the main stakeholders involved in this debate, along with their main arguments.

b) Inquiry-based learning: Students are asked to examine different sources (e.g. texts, articles, videos, images, tables and diagrams) to understand topics such as the structure and function of cholesterol, cholesterol and fat absorption, cholesterol inheritance, enzymes, plaque as well as the function of statins.

c) Citizenship education: Students are asked to suggest individual and collective actions towards the controversial socio-scientific issue of using statins or not. In addition, they are asked to participate in a public debate discussing arguments in favour or against the use of statins.

Through this process the students have the opportunity to understand the notion of Responsible Research and Innovation as they deal with the importance of science and the role of scientists in solving complex socio-scientific issues.

During 2015-16, the module was implemented by five of the PARRISE biology teachers. A total of 85 students from five public schools in Cyprus, participated in the implementations.

This year, the Cyprus University of Technology, in collaboration with the Biology Education Inspection at the Ministry of Education and Culture in Cyprus, has scheduled the evaluation of the module, to examine its affordances to promote students’ (a) conceptual understanding, (b) understanding of complex socio-scientific issues and (c) active citizenship.

As part of the evaluation study, the module will be implemented by a total of 500 students. Twenty biology teachers, including two PARRISE teachers, will lead these implementations. Pre- and post-data will be collected to investigate the impact of the module. The implementations will begin in January 2017 and are expected to be completed by March 2017.
PARRISE - Promoting Attainment of Responsible Research & Innovation in Science Education

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The next PARRISE newsletter will be circulated in June 2017.
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