



Promoting Attainment of
Responsible Research &
Innovation in Science
Education

PARRISE

Promoting Attainment of Responsible Research and Innovation in Science Education

PROJECT PUBLISHABLE SUMMARY

Months 19-36

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Science Education
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Context and objectives: why the PARRISE project?

Education through an inquiry approach in science and technology issues prepares young citizens to participate in socio-scientific debate, and thus contributes to citizens' agency. For this purpose, students need to have an understanding of the process and products of science and technology and to appreciate them as a human endeavour through partaking in their own inquiries, incorporating informed decision-making, considering and balancing relevant facts, interests, values, costs and benefits.

As concluded in the Rocard report (2007)¹ and ProCoNet midterm report (2011)², many IBSE modules have been developed across Europe, but various barriers exist that hinder in-service and pre-service teachers from working with IBSE in the classroom. In the last decades, the importance of Citizenship Education and Socio-Scientific Issues-based learning have become widely recognized. By introducing the Responsible Research and Innovation (RRI) approach into science education, we can assist young citizens in democratically participating in building science policy, thus enabling a more scientifically literate society. In PARRISE, SSIBL (Socio-Scientific Inquiry-Based Learning), brings together four closely connected concepts: RRI, Inquiry-based Science Education (IBSE), Socio-scientific Issues (SSI), and Citizenship Education (CE) in the formal and informal education of young people. See figure 1, Educational embedding of RRI.

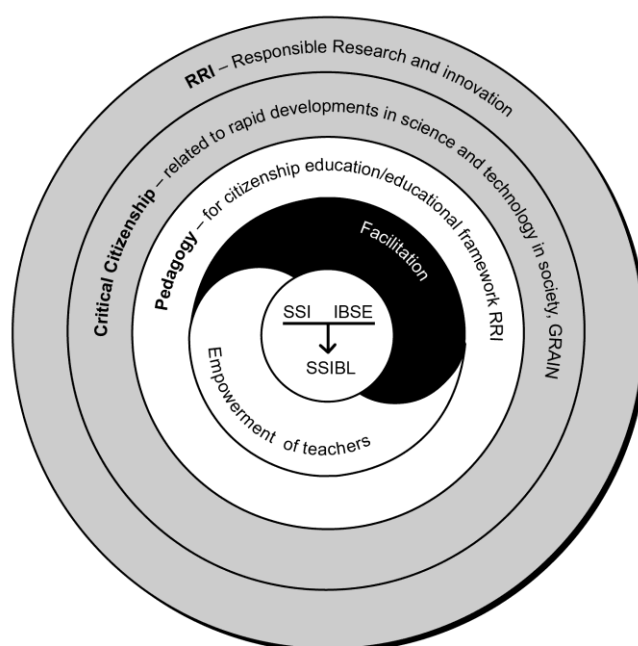


Figure 1. Educational embedding of RRI: facilitating and empowering science teachers

¹ Rocard report (2007). Science education now: a renewed pedagogy for the future of Europe, European Communities, 2007

² ProCoNet - Interim Report (2011): *The implementation of IBL in classrooms*. Available: <http://proconet.ph-freiburg.de/>

The integration of social aspects in science education (SSI), however, poses pedagogical challenges, hence a need for teacher professional development (TPD) in SSIBL. In order to reach transnational implementation, TPD programmes should meet the needs of teachers and teacher educators, adapting SSIBL to the style of individual teachers and to the culture in each participating country. In this project this is ensured by combining the development of an educational framework operationalizing RRI in terms of IBSE, SSI and CE, with the input from experiences with teacher professional development (TPD) courses for different educational levels.

The PARRISE project objective (PO) are to:

- PO1.** Provide an overall educational framework for socio-scientific inquiry-based learning (SSIBL) in formal and informal learning environments;
- PO2.** Identify examples of best practice which reflect the SSIBL model;
- PO3.** Build transnational communities consisting of science teachers, science teacher educators, science communicators, and curriculum and citizenship education experts to implement good practices of SSIBL;
- PO4.** Develop the SSIBL competencies among European primary and secondary science teachers and teacher educators.
- PO5.** Disseminate resources and best practice through PARRISE website, digital and print-based publications online and face to face courses authored by national and international networks.
- PO6.** Evaluate the educators' success using the improved SSIBL materials with pre-service and in-service teachers.

In the previous reporting period (month 1-18 of 48), objective 2 has been reached. In reporting period 2 (months 19-36 of 48), very substantial progress has been made with respect to **objectives 1, 3, 4, 5 and 6**.

Description of work performed and achievements during months 19-36

Following the first round of teacher professional development (TPD) (September 2015 – June 2016), partners have acquired extensive experience with implementing their TPD in practice. These experiences are being shared continuously among partners, throughout the year and in particular during the fourth Consortium meeting in Vienna, 24-27 May 2016.

The conclusions drawn from these experiences have been used for a thorough revision of SSIBL, the theoretical framework. This was done through critical discussion and review between the leader of WP1 and other members of the consortium. Partners in Fall 2016 for redesigning their TPDs used the resulting third version of the framework. As the second round of TPD continues during school year 2016-2017, the framework is constantly being updated.

The theoretical framework provides a consensus model for TPD for SSIBL among members of the consortium where national and cross-national teacher networks have been established. National meetings, courses and updates are regularly reported in the PARRISE newsletter, which is available for all consortium partners and their teacher educator and teacher networks. Reports on PARRISE have been given at national and international conferences including the Scientix conference in November 2016 in Barcelona which generated interest from other EU policy-makers and teacher educators as well as the Annual Meeting of EDEN, the European Distance Education Network in June 2016 in Budapest, where ICT-supported methods of science education based on the SSIBL model

were presented. At the biannual European Science Education Research Association conference, Helsinki, Finland, 31 August – 4 September 2015, PARRISE had organised two special symposia for discussing the framework and plans for TPDs.

The SSIBL framework acted as a starting point for the actual development of TPDs by the partners. In their plans for TPD programmes, team members have worked together on updating and customizing the selected training activities and incorporating them into pre- and in-service teacher education programmes. In addition, each partner has described the involvement of the networks of teachers (pre-service and in-service teachers), teacher educators, science communicators, as well as science education researchers. These networks are used for the recruitment of teachers and teacher educators that can participate in the TPD-programmes as well as for the purpose of outreach of TPD good practices after testing.

For the TPD-work, special work packages have been set up: one for primary education (8-12 years, WP2), one for lower-secondary education (12-15 years, WP3) and one for upper-secondary education (15-18 years, WP4). Members of each of these three work packages also cooperate with the other work packages. To provide external and impartial checks to ensure the quality of the project, the management structure of PARRISE includes an External Advisory Board (EAB). The board consists of external, independent members from a broad spectrum of expertise (see description www.parrise.eu):

- Prof. **Isabel Martins**, EAB chair, Institute of Educational Technology for Health Sciences (NUTES), Federal University of Rio de Janeiro, Brazil;
- Prof. **Doris Jorde**, Director Norwegian Center for Science Education, University of Oslo, Norway;
- Prof. **Russell Tytler**, Chair in Science Education, School of Education, Deakin University, Australia;
- Dr. **Pedro Reis**, Subdirector Institute of Education, University of Lisbon, Portugal;
- Prof. **Hannu Salmi**, Principal Investigator at the Department of teacher Education, University of Helsinki, Finland.

The EAB provides formative evaluation. It focuses on monitoring the quality of the products and the process of PARRISE and gives advice on advancing the implementation of SSIBL modules across Europe.

The planned TPD programmes in these three work packages vary per partner from a total of 4 to 60 hours of face-to-face teacher training sessions, depending on the local settings. However, each partner has developed teacher training activities to introduce the SSIBL framework to pre- and/or in-service teachers, encouraging them to reflect on this framework, provide different examples of SSIs, and to discuss how these SSIs can be investigated in an inquiry based manner. It is elaborated on what the societal and ethical (personal) implications related to these issues are, and partners also ask the pre- and/or in-service teachers to develop their own SSIBL-based activities and implement them in their science classrooms.

The results of the first round of TPDs (September 2015 – June 2016) have been laid down in extensive deliverables, in which partners have described their best practices, topics and pedagogies, based on the SSIBL framework. At the fourth Consortium Meeting, in month 29, partners received feedback on their TPDs and provided input for the theoretical framework. The project as a whole has received feedback from the External Advisory Board. In the Fall of 2016 the consortium started its second year of testing.

In June 2016 the mid-term review panel appointed by the European Commission assessed the project as 'Excellent'.

The expected final results and their potential impact and use

i. Supporting teachers and teacher educators

The PARRISE project empowers teacher educators and teachers via major pre-service science teacher institutions as well as the national and regional centres running in-service science teacher training courses. In pilot TPD programmes in 2014 and 2015, partners have already reached over 200 teachers and teacher educators. In the 2015-2016 academic/school year, 647 pre-service and 238 in-service teachers participated in a TPD.

The four partners active in *primary education* had a total of 32 stakeholders - including science educators in the subjects of chemistry, biology, physics, primary school teachers, informal learning educators and science communication researchers - to discuss the PARRISE project and the SSIBL framework. In the first round of TPDs, 218 pre-service and 20 in-service teachers took part in TPDs.

The nine partners active in *lower-secondary education* have involved local lower secondary education science teachers, alongside educators and experts in science education; they have reached a total of 145 stakeholders. A total of 303 pre-service and 97 in-service teachers took part in the TPDs.

The eight partners active in *upper-secondary education* have involved and established local upper secondary education teachers' networks in which were involved 115 stakeholders. A total of 126 pre-service and 121 in-service teachers took part in the TPDs.

ii. Guiding the integration of RRI in IBSE

This project will deliver an elaborated educational framework for the synthesis of SSI, CE and IBSE under the umbrella on RRI, a framework that is developed and modified in an iterative process – i.e. thinking back and forward between theory and practice - in the course of the PARRISE project. The consortium now possesses a tested theoretical framework guiding TPD programmes for pre- and in-service teachers and informal settings. The SSIBL framework enables teacher educators and teachers to develop additional SSIBL learning and teaching activities and adapt examples of good practice. As a result of this project, SSIBL teacher training modules have been and will be improved and exchanged transnationally.

iii. European approach

The SSIBL framework and the modules cover an array of socio-scientific issues, ranging from climate change to the impact of genetic testing, which are not limited to national boundaries. International exchange of teaching materials on these issues - as good practices - will help to identify local pedagogical opportunities and barriers which might be culturally specific, hence constructive strategies for adapting units for each country.

iv. Cooperation in national or international research activities

The project draws on established FP7 IBSE projects and practice from around Europe. In the course of the EU-project PROFILES, teacher communities arose in which IBSE modules were mutually developed by science teachers and used to implement in their science curricula.

PARRISE builds on these communities and introduces concepts of SSI and RRI for the refinement of the developed IBSE modules according to the SSIBL approach. In a similar way, PARRISE builds on the results of ESTABLISH, ASPIRE, PROFILES, SAILS, CoReflect and SciComPed, all of which are represented in the partners of PARRISE. After integration of results with SSIBL, exemplars which have been successfully trialled and evaluated will be published on the PARRISE website. The results of this integration will be disseminated to policy makers, science education scholars and practitioners.

Moreover, PARRISE is actively involved in other ongoing EU projects focusing on RRI, like RRI-tools and ENGAGE, by participating in meetings and workshops aiming at mutual learning.

Project public website: www.parrise.eu

PARRISE brings together 18 partners:



Utrecht University
The Netherlands



UCL Institute of Education
United Kingdom



Universiteit voor Humanistiek
The Netherlands



Umeå University
Sweden



Malmö University
Sweden



University of Vienna
Austria



University of Southampton
United Kingdom



Stockholm University
Sweden



Cyprus University of Technology
Cyprus



Weizmann Institute of Science
Israel



Alpen-Adria-Universität Klagenfurt
Austria



University of Montpellier
France



University of Porto
Portugal



Eötvös Loránd University
Hungary



University of Jaén
Spain



Ecole Nationale de Formation Agronomique
France



Radboud University Nijmegen
The Netherlands



Energy Discovery Centre
Estonia