



Student Active Learning in Science (SALiS) – An Introduction to the Special Issue

Ingo Eilks, Marika Kapanadze and Peter Childs

University of Bremen, Ilia State University, University of Limerick

eilks@uni-bremen.de, marika_kapanadze@iliauni.edu.ge, peter.childs@ul.ie

TEMPUS: Innovations by establishing European partnerships in higher education

In 2009, a cooperation of the Ilia State University in Tbilisi, Georgia, and the University of Bremen, Germany, was launched to start the project initiative SALiS. SALiS stands for 'Student Active Learning in Science' and aims at innovations in science education via reforms in science teacher training.

The idea of the SALiS initiative was to apply in the TEMPUS IV call of the European Union. TEMPUS supports the modernisation of higher education and creates an area of co-operation with and within countries surrounding the EU. Established in 1990, the scheme of TEMPUS now covers 27 countries in the Western Balkans, Eastern Europe and Central Asia, North Africa and the Middle East. The latest phase of Tempus IV started in 2008 with an annual budget of around 50 million Euro. Individual projects receive funding of between 0.5 and 1.5 million Euro.

Led by the universities of Tbilisi and Bremen, with further partners from Bulgaria, Germany, Georgia, Ireland, Israel, and Moldova, an application for a reform network was submitted to the TEMPUS program in early 2010. The funding scheme selected was Joint Projects. Joint Projects within TEMPUS are partnerships between higher education institutions in the EU and TEMPUS partner countries. The partners apply jointly for developing, modernising and disseminating new curricula, teaching methods or materials, as well

as boosting quality assurance and management of higher education institutions. Part of the funding is also designated towards modernising infrastructure within the partner country institutions.

Within this framework the SALiS consortium encompasses ten partners from six countries, of which Germany, Ireland and Bulgaria are the EU member countries and Georgia, Moldova and Israel are TEMPUS partner countries. The participating institutions are:

- Ilia State University, Tbilisi, Georgia
- University of Bremen, Germany
- Free University of Berlin, Germany
- University of Limerick, Ireland
- Paissi Hillendarski University, Plovdiv, Bulgaria
- Kutaisi Akaki Tsereteli State University, Kutaisi, Georgia
- University of the Academy of Sciences, Chisinau, Moldova
- Moldova Institute of Educational Sciences, Chisinau, Moldova
- The Academic Arab College of Education, Haifa, Israel
- Oranim College/University of Haifa, Israel

In summer 2010, the project was successfully approved by the European Union. The total budget of SALiS was approx. 800,000 €. SALiS started in October 2010 and had a duration of 24 months, finishing in early October 2012.

Focus and objectives of SALiS – Student Active Learning in Science

The central aims of SALiS are to make science education in the participating countries more motivating, more effective in the learning of subject matter and to raise its potential for the promotion of a broad range of cognitive and non-cognitive skills. Unfortunately, classroom practice in many countries of the world still seems to be dominated by a teacher-centred teaching paradigm, with low student-activity in both minds and hands. This can be also considered true in the participating partner countries within the SALiS project. That is why SALiS aims at promoting science teaching through a better inclusion of student-active and inquiry-based experimental learning in science classes. The project intends to promote inquiry-type lab-work, for example, as one of the foundations of modern science curricula and pedagogies, in order to raise motivation, to support development of higher order cognitive skills, to produce better learning of science concepts, and to promote a broad range of general educational skills.

Recognizing that the teachers are the heart of any innovation in educational settings, the project aims at innovating science teaching in the above mentioned sense by improving teacher training. For the purpose described, all participating institutions intended to innovate jointly curricula and materials for science teacher training. These curricula and materials were designed to enable pre- and in-service science teachers to strengthen hands-and minds-on student learning through innovative approaches to lab-work instruction, e.g. inquiry-type experiments, open lab tasks, or cooperative learning.



The SALiS consortium at the SALiS opening conference in Bremen in February 2011

Outcomes of SALiS – A first overview

In the two years of SALiS several outcomes were reached, of which this special issue gives an overview. Among others the following gains were reached:

- SALiS strengthened the science teacher training infrastructure in the six beneficiary institutions through equipping science teacher training laboratories, including written guides that describe the usage of such laboratories in teacher training including questions of safety, logistics and maintenance issues.
- The SALiS consortium jointly developed teacher training modules, school teaching materials, and a concept of implementation of SALiS in schools via the use of low-cost lab equipment and microscale experiments for inclusion in respective pre- and in-service teacher trainings.
- The project created the foundation for upgrading science education in many schools in the beneficiary countries by the training of science teachers. Qualification of staff for in- and pre-service teacher training concerning the SALiS philosophy took place, experiences were shared during visits and placements between the partner institutions. Through a thorough implementation of the SALiS training modules and the staff training in all partner institutions, the dissemination became broad and sustainable.
- A lab guide for low-cost- and microscale-experimentation in science education was developed and translated in seven languages. A database of more than 200 experiments in different languages for low-cost- and microscale-

experimentation was made available via the SALiS website.

- The project collected and disseminated good practices from all partner countries and made them available to the other partners by translation and adoption.
- Different joint research projects in science education were launched, e.g. on student teachers' and experienced teachers' beliefs about suitable pedagogies in science education or on stakeholder views on the goals of science education in eastern European countries.
- Although the essential components and facilities of SALiS were already available in most of the EU partner institutions, the whole process also led to an improvement in the available teacher training modules in the EU partner institutions.

For more detailed information see the different contributions within this special issue of *Chemistry in Action!* or visit the SALiS website: www.salislab.org.

Project Timetable

- Initial planning meeting, Bremen, Germany, February 2011
- First training workshop, Tbilisi, Georgia, September 2011
- Second planning meeting, Limerick, Ireland, October 2011
- Second training workshop, Chisinau, Moldova, October 2011
- Third training workshop, Haifa, Israel, December 2011
- Teachers' Demonstration Workshop, Tbilisi, Georgia, May 2012
- Final planning meeting, Tbilisi, Georgia, August 2012
- Final conference, Tbilisi, Georgia, August 2012

The project has been disseminated by talks at international conferences in Ireland, USA, Germany and a symposium at the 22ICCE/11ECRICE in Rome.

Typical workshop timetable

Each workshop typically lasted four days, with a mixture of lectures and hands-on

workshops. The idea was to give the science teacher trainers and science teachers in each country both a theoretical framework for student active learning in science i.e. inquiry based science education, and a practical appreciation of what this involves. There were also feedback and discussion sessions and opportunities for participants to relate what was being covered to their own situations. The typical programme is shown below, although this was adapted to suit the needs of each country. In this special issue we have tried to capture the content of the training workshops as a permanent record of what was done. More details of the practical workshops can be found on the project website (www.salislab.org, see p.).

Welcome	
Intro Lecture "Contemporary issues in Science Education"	Ingo Eilks
Activity "A reflection on Inquiry"	Silvija Markic
Lecture "Motivation and interest"	Claus Bolte
Public lecture with demonstrations "Inquiry learning in science classes"	Peter Childs and Sarah Hayes
Workshop on "Motivation and interest, cooperative learning and modern science curricula"	Ingo Eilks, Claus Bolte and Ani Epitropova
Workshop "Experiencing inquiry learning"	Sabine Streller and Sarah Hayes
Lab session "Low-cost-techniques in class"	Silvija Markic, Peter Childs and Marc Stuckey
Workshop "Planning and applying inquiry Learning"	Sabine Streller and Silvija Markic
Presentation and discussion of the results from Workshop "Planning and applying inquiry Learning"	Sabine Streller and Silvija Markic (coordination)
Ideas for implementation IBSE into teacher training programs	Ingo Eilks, Claus Bolte, Ani Epitropova
Reflection on the training (Outlook, further ideas, needs, ...)	Ani Epitropova

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