

# S-TEAM News No.8

## Science-Teacher Education Advanced Methods

A phase change in European Science Education

October 2008



## A waiting game (part 2)

Welcome to newsletter 7, and especially to new colleagues who have expressed interest following ECER 2008 in Gothenburg, including Pernilla Nilsson from Harmstad University in Sweden and Lynn Newton from the University of Durham in the UK.

Not too long to go before we hear some news from Brussels... the tension is mounting...

This newsletter has two main purposes. First, in response to a (very sensible) request from Nijole Ciuciulkiene in Lithuania, we have put together a draft poster illustrating the main features of the S-TEAM project. This has been circulated along with the newsletter. If you have comments for improvement please let me (Peter) know. I have kept it fairly general, and may jazz up the colours a bit for the final version.

And the second purpose...

## Science and Society consultation in UK

In the process of putting the poster together I discovered (rather later than I should have done) that the Department for Innovation, Universities and Skills in the UK has published a new consultation document about Science in Society. This is available at:

<http://interactive.dius.gov.uk/scienceandsociety/site/>

The overall tone of the document is very similar to the various reports which led to the SiS call, e.g. Rocard et al. It mentions a number of areas which are of interest to us, including teacher education, professional development, scientific literacy and science career work in schools. There are also some very cogent critiques on the website, particularly those from Professor Guy Cook of the Open University (UK) and Scientists for Global Responsibility. Generally it is worth looking at and has some useful links. There is still a day to add comments, which close on October 17th.

I have also (rather hastily) sent a short written response to the DIUS on behalf of S-TEAM, basically to 'get a foot in the door' for future cooperation. The text is as follows:

### **Response to *A vision for Science and Society: a consultation for developing a new strategy for the UK***

### **The S-TEAM (Science-Teacher Education Advanced Methods) Project**

**October 2008**

The following response to the document *A vision for Science and Society: a consultation for developing a new strategy for the UK* is

made on behalf of the S-TEAM (Science-Teacher Education Advanced Methods) project, led by Professor Geir Karlsen of the Norwegian University of Science and Technology in Trondheim.

S-TEAM is currently being evaluated by the European Commission as a response to a Call (SiS 2008, action 2.2.1.1) under the Science-in-Society strand of Framework Programme 7. The Call concerns the dissemination of inquiry based methods in school science education as a way of increasing student engagement with science, leading to greater scientific literacy and more students progressing to higher education and careers in science. It is thus relevant to the consultation document (henceforth referred to as VSS). S-TEAM currently has 26 partner institutions in 15 countries and includes a strong UK presence<sup>1</sup>. Our interest in VSS lies in strengthening the role of teacher education and science education research in order to promote the above outcomes across Europe.

The areas of public engagement with science, scientific literacy, STEM skill shortages and the more detailed areas of concern identified in VSS are common to all the EU countries and indeed to most others. VSS rightly identifies teaching in schools (para. 6.7) as a crucial factor in promoting interest and achievement in science. If teaching is important, then it follows that teacher education is even more so, since teachers need support both in their science subject knowledge and in the pedagogies necessary to deliver science education in the most effective and engaging ways. By 'teacher education', we mean both initial teacher education and continuing professional development.

A number of initiatives involving teachers and teacher education are mentioned in VSS. Our main concern in this response is to connect the UK science and society agenda, as set out in VSS, to a wider European set of responses

to similar problems. International surveys such as PISA are valuable in identifying common problems but they should not become competitions between national education systems. By addressing the common problems identified in VSS and elsewhere<sup>2</sup>, at a European level, duplication of effort will be avoided and innovative practices *developed* by teachers all over Europe, and beyond, can be *used* by teachers all over Europe.

In addition, adding a European dimension to UK science education reflects the international nature of science and technology. Collaboration in transnational teams is a common feature of both commercial and academic research in science and technology. Problems requiring scientific enquiry, such as climate change, food security and energy supply, are global problems. Future STEM graduates will need the language and intercultural skills to thrive in diverse situations and should be able to benefit from existing networks whilst at school. At the same time, engaging in international collaboration and debate encourages inter-disciplinary activity and whole-person educational outcomes, as sought by initiatives such as *A Curriculum for Excellence* in Scotland.

Teachers in the UK therefore need to be aware of the pedagogical nuances of science education in other national contexts and will also need access to innovative practices and research at European level. Academic research in science education has already crossed borders and formed alliances, many of which are represented in S-TEAM. Because science education is multi-dimensional, and because research in science education is a huge and complex field, however, much of what is known about teaching science remains at the level of 'local knowledge'. Equally, not every aspect of science education can be generalised, but common understandings of concepts can be

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<sup>1</sup> Currently University of Bristol, University of Leeds and Strathclyde University

<sup>2</sup> e.g. *Europe needs more Scientists Now!* (Rocard, 2007) at: [http://ec.europa.eu/research/science-society/document\\_library/pdf\\_06/report-rocard-on-science-education\\_en.pdf](http://ec.europa.eu/research/science-society/document_library/pdf_06/report-rocard-on-science-education_en.pdf)

usefully generated in cross-disciplinary and cross-cultural dialogue.

Projects such as S-TEAM are therefore necessary to connect groups and individuals in different localities within science education. It is also necessary to embed the new knowledge gathered by such projects within teacher education, in order to sustain its use and to facilitate further development by and for teachers.

In relation to VSS, then, our argument is for

- prioritising resources for teacher education in science and technology
- enhancing the status of teachers as mediators of scientific knowledge.
- Adding a European dimension to science and society programmes

We would like to address a further, more general point concerning the nature of the debate around science and society in general and VSS in particular. The nature of scientific debate is that it is both rational and supported by evidence, but open to uncertainty. At present, the debate about science and society is not as soundly based on evidence as it could be. For example, the international ROSE project<sup>3</sup>, based in Norway, has found that positive pupil attitudes to science vary inversely with the level of development of the country concerned. This has profound implications for the debate. In particular, it suggests that scientific literacy and increasing the desire of pupils to take up science as a career may not be compatible policy objectives.

STEM career choices may be influenced by labour market conditions as well as school experiences, whilst scientific literacy should, if taken seriously, be part of a wider set of critical thinking skills rather than simply an application of factual scientific knowledge or even of scientific methods. Furthermore, in a crowded school curriculum it is difficult to prioritise both

scientific literacy and the teaching of substantive scientific knowledge, which in any case is always increasing in its range and complexity. Scientific literacy requires contextual knowledge from other fields, such as geography, sociology and economics and is thus an interdisciplinary area rather than being a subset of science itself. We are glad that this is recognised in VSS.

We also agree with some of the previously published responses that there needs to be more consideration of the relationship between Science, Technology, Engineering and Mathematics. Engineering, for example, has been seen in some contexts as a craft skill rather than an academic discipline. Technology is frequently grouped with art and design in schools. Neither of these approaches is necessarily wrong but there needs to be more careful consideration of the relationship of these topics within the curriculum and how synergies can be developed between them.

Our overall view of VSS is that it has provided a timely and comprehensive stimulus for debate on a topic of huge significance. We look forward to making further contributions to this debate and to finding ways of connecting UK developments in science education and career development to a wider European arena.

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<sup>3</sup> Relevance Of Science Education: see <http://www.ils.uio.no/english/rose/about/rose-brief.html>

