University of Education Freiburg

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INSTEM 1st Newsletter



GLOBAL CHALLENGES ...

... such as global and climate change, call for innovative solutions. To meet these challenges, students must understand fundamental concepts of science and be able to use them. Enquiry-based teaching, methods to reduce the gender imbalance and better information on science careers can make science education more attractive. Implementation of these educational innovations requires collaboration with key-actors such as teachers, teacher educators and policy makers. But such actors need sustained long-term structures. Hence INSTEM will synthesise the extensive knowledge and experience from many EU projects, and make this material accessible and relevant through innovative dissemination methods and sustainable national working groups to transform science teaching.

INSTEM is unique as many of the partners are representatives of European projects. As a network of networks it will reach a wide audience across Europe and have significant impact. As the coordinator of INSTEM I would like to welcome you to our first newsletter. From now on the newsletter will be published on a regular basis to keep you informed about science education.

Prof. Dr. Katja Maaβ

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INSTEM ...

... is a network of networks drawing upon materials from 20 projects and 300+ institutions and bringing together 11 Universities, 3 schools and 56 associated partners. This will ensure the best possible valorisation of existing project results to about 45,000 teachers.



"INSTEM represents a new movement towards a learning-based approach in science and mathematics (STEM) education."

ENQUIRY-BASED TEACHING ...

... methods to reduce the gender imbalance and better information on science careers can make science education more attractive.

Implementation of these educational innovations requires collaboration with key-actors such as teachers, teacher educators and policy makers. But such actors need sustained long-term structures, and an excess of innovative teaching resources from diverse projects is overloading them with information.

INSTEM

INSTEM represents a new movement towards a learning-based approach in science and mathematics (STEM) education. A large number of projects in STEM education have responded to calls within Framework Programme 7 and the Lifelong Learning Programme, but the learning from these projects is fragmented and has not yet been fed back into the system.

INSTEM will gather and promote the learning from successful European projects, which have advanced the cause of better science and mathematics education. These projects should have a combined voice in order to advance the cause of Inquiry-based learning, but until the advent of ProCoNet (Project Coordinators' Network) in 2011, there was no forum in which the results of these projects could be discussed. Now, with INSTEM, we are focused on extracting and synthesising the learning from the extensive work already carried out in these projects.

This is more than a cataloguing operation, although we will be providing links to some significant materials and resources produced in other projects. Primarily, our intention is to assess the real learning from projects, rather than evaluating whether they have achieved their objectives as set out in proposals or 'technical annexes'. This is not being done in a judgemental way, but in a spirit of collaboration and development. The learning from projects is twofold: learning about science and maths education, and learning about how projects function effectively within the EU and national systems. We are already finding that our results are similar to those of other transversal projects such as Xploit and DESIRE.



INSTEM partners around Europe (map: Martin Lindner)

What we know already is that enthusiasm for inquiry-based learning needs to be matched by high-quality teacher professional development and a range of support materials. We also know that teacher collaboration and peer support are essential, together with better initial teacher education, taught through inquiry-based methods. Extensive subject knowledge and experience with a wide range of pedagogical practices are both required, leading to an overall increase in teachers' confidence and teaching quality.

In addition to producing synthesis and state-of-the-art reports, IN-STEM will be holding national workshops in all its partner countries to assess practitioners' use of European project materials and to find out how future projects could be better aligned with the needs of teachers and students. These will be listening workshops, and we will not be persuading teachers to increase their workloads or change their practices unnecessarily.

The overall intention of INSTEM is to cooperate with the EU, leading to a long term, fully sustainable and more holistic approach. This means that multiple methods can be used to develop STEM education, ranging from traditional, direct teaching, through inquiry, to active participation in scientific practices. Teaching needs to draw from multiple disciplines to help students consistently develop their scientific thinking across a range of subjects and make sense of complexity in science and in society.

Dr. Peter Gray

INSTEM PARTNERS

- 1 University of Education Freiburg
- 2 Institute of Technology Trondheim
- 3 University of Innsbruck
- 4 MLU Halle
- 5 University of Liverpool
- 6 University of Napoli
- 7 Dublin City University
- 8 University of Exeter
- 9 Haceteppe University Ankara
- 10 Institut Magurele, Romania
- 11 Technology Foundation Greece
- 12 Bodmin College, UK
- 13 Walter Rathenau Vocational School, Freibung
- 14 Ellinogermaniki Agogi School, Greece

BODMIN COLLEGE

Bodmin College is a large 11 - 18establishment providing an 'outstanding' educational experience in which we maintain high standards of achievement and traditional values within a disciplined and caring environment.

Students are encouraged to enjoy their education, to develop respect for others and, through assuming responsibility, to develop as reliable and mature individuals ready to take an active role in adult life.



BODMIN COLLEGE AND INSTEM

Bodmin College is a state secondary school in Cornwall, UK and educates over 1500 pupils. We teach from ages 11 to 18 and specialise in science.

We have been granted several awards for science including 'Specialism Quality Mark', 'Royal Society Associate School' and 'Leading Edge' school. We have always been very keen to work with outside agencies whether this be science businesses, universities or individual scientists.

The sorts of activities that we have recently carried out include:



From left, head teacher Brett Elliott, Martin Dixon and head of science Dave Salter with students in an action-packed science lesson. Photos on the next side: Martin Dixon teaching students at Bodmin College (photos: M. Dixon).

Making a film about the potentials for biofuels http:// www.guardian.co.uk/science/video/2012/dec/14/biofuels-fuellingfuture-video

Working with university students to increase the uptake of triple science and modern languages http://www.linksintolanguages.ac.uk/ resources/2552

Working with the Marine Biology Association to have scientists mentor students as they carried out in-depth investigations into marine algae http://royalsociety.org/education/partnership/bodmin-college/

Studying seabird populations with the help of a local business that uses an RIB http://www.thisiscornwall.co.uk/Prize-Pupils-dolphinwatching/story-17123808-detail/story.html#axzz2QX3Wz8pQ

Being part of a group looking into the way that genetics is taught in schools and trialling how successful the teaching of genomics can be. http://www.nowgen.org.uk/CubeCore/.uploads/documents/nsgp/ Modern_genetics_in_schools.pdf

Working with the Nuffield foundation to provide opportunities for pupils to work in research labs during their holiday time – even leading to a student publishing her work at a 'Diabetes UK' conference. http://www.thisiscornwall.co.uk/Zoe-s-work-highlighted-national-conference/story-18000375-detail/story.html#axzz2QX3Wz8pQ

Working with the University of Exeter on their 'Metafora' http:// www.metafora-project.org/ and SEDS projects http://scienceeducation-for-diversity.eu/



"We have always been very keen to work with outside agencies whether this be science businesses, universities or individual scientists. "

It was whilst working with Exeter on these two projects that the college forged a closer relationship with researchers from the University of Exeter and began to try to get teachers themselves involved to some extent in thinking about research matters and conversely the researchers more involved in the teaching side of things. We were particularly looking at how to improve the engagement of young people with science by developing a framework of principles for the design of educational activities that addressed the diversity issues. We focussed on student voice and used questionnaires, field notes, video and interviews as methodology. We found that 'dialogue' and 'reflection' were the most challenging aspects of the project. Pupils responded particularly well when given choice over what they



BODMIN COLLEGE

Bodmin College is an outstanding College. The curriculum is outstanding and fully meets the needs of all students, who throughout the College receive excellent care, guidance and support.'

"... Students feel very safe and are committed to a good, healthy lifestyle. Behaviour is good; and spiritual, moral, social and cultural development is excellent."

In 2010 Bodmin College received an 'outstanding' report from Ofsted.

studied from pre-selected topics.

They chose to investigate communication in Cornwall and organised a visit to Porthcurno telegraph museum and were also inspired by Marconi's work. The outcomes were sometimes surprising, often encouraging and both staff and pupils were overwhelmingly positive in their feedback.

It therefore seemed logical and appropriate that Bodmin College would be part of the INSTEM programme. We are very keen to gain from the undoubted expertise that exists across the whole range of European partner institutions. STEM research should inform and improve our own teaching. We also feel strongly that the existing separation between what research is done in universities and the impact that this has on teaching practice is far too great. We hope that a project such as INSTEM can really begin to break down the barriers between formulators of education policy, university research and teaching of STEM subjects in schools. We look forward to the next couple of years with excitement and anticipation.

Dr. Martin Dixon



INSTEM ROMANIA

The Center for Science Education and Training at the National Institute for Laser, Plasma and Radiation Physics in Bucharest, the Romanian partner in the INSTEM project, coordinates the national research project "Inquiry-Based Education in Science and Technology: i-BEST" (http://education.inflpr.ro/ro/ IBEST.htm) aiming to support inquiry-based science education at primary and middle school level. In the frame of this project the international conference "Science Education in School" and the "Science Stars" contest for school students were organized in the city of Galati, on the Danube River. As we intended to bring in Romania the know-how of our colleagues from different European projects (Fibonacci, INSTEM, Hands-on Science), several



"These days were an inspiring experience for all the guests, students as well as for the organizing team. "

workshops for primary and middle school science teachers were run during the conference, by lecturers from Austria, Bulgaria, France, the Netherlands, Serbia, Slovenia, and Turkey. We think that this approach illustrates the spirit and the goals of the IN-STEM project: to integrate the European wide expertise in IBSE; to be a platform for the exchange of practices and methods in IBSE and teachers training.

Conference "Science Education in School"

On the 19th of April 2013 the fourth international conference "Science Education in School" took place in Galati in the East of Romania. Suzanne Kapelari, partner in the INSTEM Project, was one of over 100 participants and presented the Commenius Project INSTEM as well as EU 7th framework INQUIRE-Project.

On the following day more than 250 pupils took part in the "Stars of Science"-Students Contest, where they presented scientific experiments to a jury of experts.

The "Science Education in School"-Conference was organized by a team of academics, teachers and school principals in order to integrate newest research questions and findings from national and international projects into practical workshops and a student's contest. With this broad variety of contents and activities the maximum number of target groups can be reached.'





Dr. Suzanne Kapelari (picture above) and Dr. Dan Sporea (picture below) presented the Commenius Project INSTEM at the conference in Galati (photos: A. Sporea).

ORGANIZATION AND SUPPORT

Dr. Adelina Sporea (Project i-BEST "Inquiry -Based Science and Technology Education")

School Inspectorate of Galati County

National College "Alexandru Ioan Cuza", Galati, School no. 28 Galati

Dr. Dan Sporea (INSTEM Project), Center for Science Education and Training (CSET) of the National Institute for Laser, Plasma and Radiation Physics, Bucharest

Galati Town Hall

Natural Science Museum, Galati

And various local sponsors

Guests from the international Fibonacci-Project of France, Serbia, Bulgaria and the Netherlands as well as guests from the INQUIRE- and INSTEM-Project in Austria and a private initiative from Turkey were invited to present their work to an interested audience of teachers, students and representatives of the regional school authority and municipal government.

In the afternoon teachers were also invited to experiment and discuss inquiry based science teaching and learning with the international guests in various workshops.

A highlight for students was the "Stars of Science"-Contest where more than 250 "young scientists" in various categories, presented their individually designed experiments to the international jury in order to get crowned the "Star of Science".

These days were an inspiring experience for all the guests, students as well as for the organizing team. The commitment and enthusiasm of our young scientists who completely and happily lost themselves in the world of science, mathematics and technics tells us that such events should be repeated on a regular basis.

Dr. Dan Sporea



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Students contest at the Galati conference (photo: A. Sporea).