

Physics education

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Having just finished rereading *Einstein lived here* by Abraham Pais it is with a strange notion I write this commentary. Einstein who died 50 years ago, created a decisive foundation for modern physics exactly 100 years ago. He was an immensely popular figure in his days, both among ordinary people as well by the leaders of this world. He still is today.

To commemorate his work 2005 has been named the *World year of Physics*. Again, when writing these lines, hundreds of activities are being carried out through the world. More people than ever will be given a unique possibility to learn about physics, explained by the very best physicists.

People will become acquainted with the beauty and logic of physics a logic that together with advanced technologies has proven so strong in transforming our societies and our lives. Physics is in nearly all aspects a success story that any other business should envy was it not for one thing. The customer base is weak: the young students don't like physics.

As in all other areas of life physics is a human activity. Progress is ensured by talented individuals that advance the field through a combination of skills, insight, dedication and hard work. The reason we admire "our" great physicists are exactly for these reasons as they combine the very best of human activity and at the same time advance their societies.

That was the way we all used to think of physics. We entered the field ourselves, because we simply could not stay away from it. We studied hard and we were lucky enough to find jobs within physics. A career in physics and in science in general, was seen as the ultimate life and so it was. But not any longer is this the case.

A team of physicist, lead by Svein Sjøberg of Oslo University, has conducted a comprehensive study of the relevance of science education (ROSE) among young students in 30 countries around the world. The results of this investigation leave room for reflection in the physics community.

The ROSE project investigates in closer detail the status of science education in a large group of countries. In most countries the students acknowledge the importance of science and technology (S&T) as important for society, that S&T can find cures for diseases and that it will make work more interesting. The same students, however, do not trust scientists nor find S&T neutral and objective. Worst of all, these students dislike S&T at school and they would not consider becoming a scientist themselves. What is true for boys are even truer for girls.

This is a challenge EPS must face with a future of physics different from what we have become used to. There will still be room for new Einstein's and Bohr's, but we must make room for more. We must develop a physics culture better in tune with society and the expectations of the next generation of physicists. Education is the only tool we know of in this respect.

This was the subject of an EPS executive council meeting held in Vilnius in February. This *Journée de Réflexion* on 'Education' brought together educational specialists from a number of countries and organisations working with educational issues and outreach activities. Réflexions centred on two distinct issues, an analysis of the present situation exemplified by

the extensive ROSE investigation and a solution phase, where several speakers presented different models for actions.

Henrik Busch gave a vivid account of the results of ROSE in Denmark, Claus Madsen of EuroForum presented a model for science outreach conducted by the large research organisations in Europe and Erik Johansson of the EPS Education Division described the Stockholm model of science outreach through Alba Nova, the house of science. Jon Ogborn presented the impressive IOP initiative on *Advancing Physics*, Jens Holbeck introduced HOT physics (higher order thinking) and Saul Vingeliene presented impressive figures for the development of science education in Lithuania.

The executive committee decided to maintain focus on educational issues. Thus a follow-up réflexion will be held in Bern July 8 2005 prior to the EPS General Conference and just following the EPEC conference at Bad Honnef July 4-7, 2005. The EPS council will take part in the educational réflexion together with invited practitioners.

To highlight science education is by no means new. Many research groups work with educational themes and much is known about possible solutions to the problems illuminated by ROSE. We are dealing with a community that has developed cures for others, but not yet have learned how to cure ourselves. There is a strong focus on science, technology and innovation and a lesser focus on education, in particular on education in the preuniversity sector. There is much focus on the brilliant science students and less focus on other students with other talents. This poses a democratic problem if actions are not taken now.

EPS is in a unique position to mediate best educational practices among its large membership. Some of us who met in Vilnius continue in Bern and hopefully along the road will develop a keen understanding of the importance of improved educational practices in physics education. All of us, EPS, its divisions and affiliated EU networks on physics education must walk in unison to work to improve the present situation. ■

ROSE project

The Relevance of Science Education Project (ROSE) is an international project, involving over thirty countries, based at the University of Oslo in Norway under the leadership of Professor Svein Sjøberg. The research in England is being conducted by Professor Edgar Jenkins and Nick Nelson at the University of Leeds. The project seeks to establish what students think of their school science classes, what they would like to learn in their school science education, their views about a range of environmental issues, and what research they would wish to undertake if they were practising scientists. The project thus differs from other international comparative studies where the emphasis is on the curriculum as a broad explanatory factor underlying student achievement (TIMSS) or on the extent to which education systems prepare students to become lifelong learners and informed citizens (PISA). It also differs from these studies in including data from a larger number of developing countries. The ROSE project thus reflects the recent growth in interest both in comparative studies and in identifying and responding to the 'student voice' in science education.

The project is funded by the Research Council of Norway and the University of Oslo and, locally, by the University of Leeds.