

Science in a changing Education.

The contribution of the Hands-on Science network to the improvement of science education.

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Abstract. Science and Technology have a major increasing role in today' Society and in the lives of everyone of us. No further substantive and sustainable development of our economy and society may be foreseen without a leading enlarged and improved scientific and technological research. Improving Science Education is fundamental as well as effectively setting as major priority to raise the levels of scientific and technological literacy at all levels of our society.

The enlarged European Union facing new developmental challenges and aiming a decisive global affirmation in the world needs to grow effective steps towards the establishment of a sound science and technology culture in our societies, as steady basis for the improvement of Science and its technological applications. Practice work is essential to the understanding of Science and thus fundamental to Science and Technology literacy.

The new stringent requirements of the modern society demand not only the gathering of specific knowledge but also and especially of the competencies and the ability of acting interactively to be able to find analyze and solve new interdisciplinary problems. The best way of achieving an adequate education of our students on these issues is by inducing the students to an active committed participation in the teaching/learning process, through practice and experimentation. The pedagogic approach we suggest to be used relies on a functional integration of different pedagogical theories and practices namely the constructivism, conceptual learning and

pro-active learning by hands-on experimentation and research. Responsibility, critical reasoning and observation, method and flexibility, interdisciplinarity, volunteer self-rewarding commitment, joint efforts and teamwork, are among the main keywords that should guide all pedagogical activities in our modern schools.

Education reforms are being implemented in many countries. The type and extent of the reforms vary significantly but share the increased significance given to Science Education that is becoming a major constituent of school curriculum. The need of practice and experimentation in the S&T learning process is also being increasingly recognized. And this is also the main goal of the Hands-on Science network.

In order to define the best paths to assess prove or justify the importance of active learning of science by hands-on experimental work the network organized already many different activities. Last year in Ljubljana the "1st International Conference on Hands-on Science. Teaching and Learning Science in the XXI Century" was an excellent forum where 120 participants 13 countries presented and discussed the main aspects of modern Science Education establishing the basis for the work the network developed thereafter. The stringent problems of the access of women to Science both in education and as career, and the challenges of EU' development and the importance of scientific literacy were discussed in two thematic workshops organized in Köln in June 2004 and in Malta in January this year. Next year the issue of life-long learning and

scientific literacy will be the theme of our 3rd workshop.

The network promoted and induced several new cooperation projects at EU level in the field of Science and Technology education. Six Comenius 1 school' projects and two Comenius 2 projects were presented and many more will be in the future. A Comenius training course on "School' Robotics" for schoolteachers was rather successfully organized in April this year. Others will in different topics on the months and years to come. The establishment of student' Science Clubs is being supported in different countries. Science fairs, contests and other informal or non-formal educational activities that bring together students, teachers and education specialists, research institutions, the industry and the community in general were promoted or supported. Several scientific papers and communication were produced and published in different languages.

Experiment's guides, books, CDROM and DVDs were produced. A public relations campaign is on the way aiming EU' schools, governments, parliaments and decision makers, universities, networks and national and transnational associations, science museums and other institutions involved with non-formal or informal education, the industry, local communities and the citizens in general. New Associated Members from most of the European countries are constantly entering the network enlarging the impact and effectiveness of our activities.

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