

CONCLUSIONS

reached by the Conference

L'apprentissage des sciences dans l'Europe de la connaissance

Grenoble, October 8-9, 2008

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These conclusions will be brought to the attention of Councils of Education and Competitiveness.

The participants in the Conference, coming from all EU countries, wholeheartedly agree that science has to play a central role in the construction of the Europe of knowledge.

Excellent and recent European or international reports have analyzed the current status of science education, the attitude of youth towards science, the needs for developing new competences for a variety of careers, the serious issues for the culture and the shortage of manpower in industry. Without underestimating the importance of informal education, these reports show a consensus on the need to act urgently and in a cooperative manner on the formal education systems, at all levels beginning with pre-school. The Conference unanimously agreed that these many analyses make clearly explicit the reasons for urgent action.

Natural sciences, which are naturally related to mathematics and technologies, represent a unique field for such a European cooperative action, given

- the historical and present role of the European creativity and diversity both in the advent and growth of modern science ;
- the universality of science, scientific attitudes, concepts and the research community, which exhibits a convergence of objectives, methods and implementation in educational systems and structures, no matter how different they may be ;
- the growing will and involvement of the scientific and engineering communities to contribute to the needed improvement of science education.

It has been stressed that improvement and changes in science education and its pedagogical methods must be provided both in any Member State by universities, educational systems and authorities, and in addition by EU institutions, according to their own means of intervention. Therefore, the Conference conclusions and recommendations on science education are directed towards

- the Ministers of Education & the Ministers of Higher education and research in EU states, in preparation of their forthcoming meetings in 2008 ;
- the EU Commission, as a support and detailed enrichment of its Communication on the matter.

The conclusions recommend three types of actions, which will mutually reinforce each other

- a thorough action in each nation for the improvement of science education and especially for renewed pedagogy ;
- an intensified cooperation between Member states ;
- an increased action based on the EU Open method of coordination.

The Conference insists on two specific aspects to be addressed

- the need to learn from and develop successful practices at a very large scale ;
- the need of a long-lasting effort, of the order of a decade or more.

Creativity of teachers will stimulate creativity of students. As innovation in science education is made of invention, implementation and dissemination, each of the following items needs addressing, a number of these paths being already explored locally and with success in EU

TOWARD TEACHERS:

1. Teachers professional development by :
 - a. Developing self-training, distance training, session training tools ;
 - b. Developing criteria of quality for training ;
 - c. Developing systemic analysis of teacher training (cost, implementation..) ;
2. An *Erasmus* for teachers
 - a. physical circulation of teachers over Europe, to create a face-to-face community of exchanges and stimulation, parallel to the scientific community ;
 - b. exchange of experts ;
 - c. an ICT platform and database for collaboration of professionals ;
3. Facilitating, by national and transnational EU networks, close cooperation between :
 - a. teachers and the research community ;
 - b. teachers and schools with industry partners ;
 - c. teachers and centers for informal education.

TOWARD CONTENTS

1. Better integration of scientific disciplines, from the point of view of :
 - a. the student : curriculum, activities, diversity of talents ;
 - b. the teacher : understanding of the nature of science, epistemology, history, ethics ;
 - c. Wider practices of interdisciplinary cooperation among teachers ;
2. Experimental access to mathematics at all school levels ;
3. Sharing of resources for curriculum design and implementation, supporting outreach from research institutions ; material equipment of schools ; quality control with respect to the diversity ;
4. Designing methods of student assessment, being in harmony with a renewed pedagogy of science.

TOWARDS STRUCTURES

1. Developing networks of pilot centers, in every EU country, accounting for the diversity of local conditions but closely related to each other Europe wide, in order to disseminate and capitalize innovations ;
2. Supporting a program of research into student and teacher attitudes and effective pedagogy.

To build the Europe of education, science provides an exceptional leverage. This common ambition, to be manifested by an EU coalition, opens an immense field of partnerships in Europe. It may materialize by the creation of a high level and visibility *European Council for Science Education*, in order to advise and stimulate the progress of these actions, in close cooperation with Member States and the EU Commission directorates.

Comments to be sent before October 16, 12 :00 am to
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