



CONFÉRENCE

# L'APPRENTISSAGE DES SCIENCES DANS L'EUROPE DE LA CONNAISSANCE

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# SCIENCE LEARNING IN THE EUROPE OF KNOWLEDGE

## CENTRAL THEME OF THE CONFERENCE

1. Developing the knowledge society in Europe involves a **reform in science education** from primary school through to university.
2. Science education includes mathematics and experimental and observational sciences. These two fields require the greatest attention. While the former rightly plays a major part in the training of pupils it is nonetheless necessary to continue reflecting on the way it is taught. As for the latter it will have to be **renewed in its approaches** for its role in both scientific training and the development of citizenship.
3. **Science and technology are closely linked** in the world that surrounds us, but their purpose and functions remain distinct.
4. Through the exceptional pooling of multiple skills, the **Europe of science**, at the end of the 20th Century, has regained its world leadership position. This cooperation, initiated by the scientific world from a diverse range of institutions, has succeeded in involving policy decision-makers. The success of this project is due to the fact that science is universal, as much in its study objectives as its methods. It is also due to the fact that the history of scientific development is largely intertwined with that of Europe, at least until 1940.
5. To date, the **principle of subsidiarity**, implemented in primary and secondary education, has not enabled a meaningful common European effort to develop in the field of science education. However, a few advances can be highlighted: the Erasmus and Comenius projects, the diagnoses made on primary and secondary education (Eurydice 2006, OECD Report 2006, Rocard Report 2007), training initiatives between pairs within the maths, science and technology cluster and certain initiatives developed in the name of research by the *Science et société* programme (DG XII). However, the European states have not yet examined this issue to a degree in line with the creative potential available in the scientific and educational world or the ambition of the Lisbon objectives.
6. Besides the objectives within Europe, the issues of **access to and the quality of elementary science education** (compulsory education) in the world are now a key factor for development. This will not happen without significant contribution – currently insufficient – from the developed world. Again, the universal nature of science offers Europe a field of cooperation, both within its borders (South Eastern Europe, Council of Europe countries, the Mediterranean) and overseas (Africa in particular, Asia, South America). To date, this cooperation has barely touched the field of science education.
7. Many **European academies of science** have identified these challenges and have become involved in new experiments or projects: particularly Germany, the United Kingdom, Sweden and France, but also Estonia, Hungary and Slovenia.

8. It is now widely agreed, at international level, that a **more active pedagogy** using the investigative approach is required. This, started at primary school, should be continued throughout secondary school, rendering science education enjoyable and introducing the joy of discovery, observation, hypotheses, experimentation, the right to make mistakes, to deduction and to expression in an appropriate language; importance being placed on the diversity of intelligence of young people, there being so many roads to abstraction. Herein lies a solution to the (false) dilemma between science and technology. A pedagogy that is too formal, excessive division between disciplines and the absence of a link between taught science and its history, particularly in Europe, inhibit change, which has many sources. Training would gain in effectiveness if the objectives were approached with a complementary view of the disciplines and not through juxtaposed studies over the year or even the curriculum. Certainly, the initial and continuing training of primary and secondary school teachers is key to resolving the current situation; few countries have a strong policy in this field, with regard to science, except the United Kingdom, Finland and Sweden.

9. Besides the didactic and pedagogical aspects, science education and, beyond this, the states' education policies, must address the issue regarding **pupils' access to and success in science and technology courses**. The significant under-representation of girls in this field, the problems encountered by young people from minority groups and socially disadvantaged backgrounds are currently being examined by all education systems. The pooling of ideas on the practices and tools used and efforts made to change social representations and stereotypes and the reform of curricula and teaching practices must of course incorporate these issues.

10. Certainly, looking at the development of tools and resources for the professional training and development of teachers and using the support of a scientific community outside the European Union can also **effectively reform science education**.

11. The 2008 Conference should culminate in recommendations and firm proposals regarding these key points. Europe and its member states would find it a matter for an offer of **international cooperation for the development of quality science education**.



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