

## Initiatives for stimulating the interest of youngsters

Please find below the main conclusions of the European Project Eurotraining (<http://www.eurotraining.net/>) related to the analysis of European initiatives that were identified for stimulating the interest of youngsters in science and technologies, especially in the area of micro and nanotechnologies.

### Context

Today, scientific culture is going through a deep crisis. In all European countries, pupils and students are losing interest in scientific and technical careers. Yet, in the public there is an increasing social demand for understanding the current changes in sciences and techniques including bio-technologies and energy. Also, the number of students in scientific and technical studies is a key factor for the economical competitiveness of a country.

The reasons for this loss of interest are multiple: the bad image carried by science and technologies among youngsters (negative aspects are often emphasized), the social status of technical careers (engineers, researchers, teachers) relatively degraded compared to business and services careers, the aridity of sciences studies in a world where diffusion of knowledge and information is often superficial.

### Frame of study and main conclusions

About 500 initiatives of the whole of European Community were identified and commented. The initiatives identified are designed for youngsters from primary school up to the first years of university. They are classified and analyzed in a file attached separately which describes initiatives country by country. A survey was also conducted among the managers of the initiatives and enabled us to draw the following conclusions:

- The efforts are more or less proportional to the economic activity of the EC member states.
- Most initiatives are implemented by governmental organisations (local or national). However, some private initiatives were also found.
- The reports obtained underline the importance of actions conducted during primary school because the pupils form themselves an image of science and technologies up from a very young age and vocations are determined before high-school.
- The vast majority of actions requires a small budget and involves less than 100 youngsters. They are often done at school or during extracurricular activities.
- There are hardly any indicators for measuring the impact of these actions.

### Identification of some exemplary actions

Some actions with a very positive feed back were identified and serve to illustrate the different type of actions possible.

#### ***Action "hands on science" in France***

The initiative „les Mains à la pâte" (Hands on science) has been launched by the Ministry of education in France at the initiative of a Nobel prize winner for physics, Georges Charpak, in cooperation with the Academy of sciences. The objective is to promote within the primary school a creative and innovative approach to promote the interest in science and scientific research. Since 1996, the project ASTEP ("Supporting teachers through the involvement of scientists in primary education") has encouraged researchers, science students, engineers and technicians from companies to assist (in the role of scientific tutor) primary School teachers in the implementation of an investigative approach to science, as defined in the current Primary School curriculum. This implementation of this process, for which the teacher is primarily responsible, aims to enable pupils to acquire and build scientific knowledge by themselves through self-discovery. All the actors (teachers, pupils, external contributors) benefit from a mutual

enrichment. The teacher, not necessarily from a scientific background, discovers what is involved in the investigative process. Thanks to the presence of the scientific tutor, the teacher approaches the science curriculum with less apprehension, becomes more self-assured in the conduct of scientific or technological processes and consolidates his/her mastery with regard to scientific content.



The ASTEP initiative has been promoted by the Academy of Sciences and was introduced in 1996. Having started with a few pilot sites, there are today 60 centers in the partnership with twenty classes each, and it currently involves approximately 1000 to 1500 students-tutors with between 25 to 30,000 pupils currently benefiting from this collaborative teaching approach. The initiative is estimated to represent at least 15 hours worth of class time every academic year for those pupils involved. This number is modest but not negligible. To assess and develop the ASTEP approach, several symposia have been organized since 2003. Today, a research team working on this form of collaborative teaching is in the process of being established. The project endorsed by the French Academy of Science, the Ministry of Education, the Ministry of Higher Education and Research, is coordinated at national level by La Main a La Pâte and at regional level by various universities and engineering schools. At national level, the necessary manpower for effective implementation requires more than 50% of a full-time position, for management and coordination purposes.

The major interest of this initiative is to involve children at a very young age which is decisive for the formation of their image of science. Experimental aspects are given a large place which contributes to eliminate "boring" theoretical approaches and establish precise links with the real world.

### ***The "Roger Van Overstraeten" action (RVO) initiated by the Institute of Microelectronics and Components (IMEC) in Belgium.***

IMEC aspires to make technological education stimulating and captivating - preparing young people for a future of technology, and motivating them to take up technological studies. To that end, IMEC established RVO-society. RVO-society develops technology lessons for primary schools, organizes technology summer camps, and teaches highly-interactive courses on electricity, making chips, building web sites ...

Everybody must be able to discover and enjoy the possibilities offered by science and technologies. This is an essential condition for taking full part to a society that is more and more based on knowledge.

The RVO-society is clearly directed at 3 target groups

- youngsters
- teachers
- professionals

The RVO-society gathers information at the limits of research which are translated and communicated to teachers and public. Teaching is the most suitable way of reaching a large group of youngsters. Therefore, the RVO-society designs attractive and interesting educational material about recent developments in science and technologies. The objective is to come up with material simple to use and corresponding to the last trends in educational methods and didactics.

## Projects

The RVO society focuses on different projects. Her hobby-horse at the moment is “Chip! Chip! Chip! Hoera! Other current projects include : Wardje en Oortjes Gespits, Sluit de Stroomkring, JobsAT, WordWebWonder et CERA Award.

These tools motivate teachers to organise more sessions of scientific awareness in their class and enable children to discover the importance of sciences and techniques in our society. By October 2008, the first pilot experiences on this theme were carried out in different school of Flanders. In the same time, the association “Hypothesis of Liège” has accompanied the didactic experimentations in several walloon schools.

This initiative shows the potential actions of big European laboratories in the area of advanced technologies. The principle is to organise leisure with a scientific or technological objective in the same way that it is possible to organise leisure with a sporting objective

## « NanoTruck » initiative in Germany

As one of the most promising cross section technologies, nanotechnology opens up the world of the smallest things to us. Nanotechnology allows us to investigate and process material in a size dimension smaller than one hundred millionth of a meter (100 nanometers). In energy, environmental and information technology, but also in the health care sector nanotechnology allows us fascinating insights and better or new procedures and products. However it also opens up interesting career chances and exciting fields of work above and beyond almost all disciplines. Therefore the Federal Ministry of Education and Research supports this pioneer technology in the scope of high-tech strategies for Germany with the "Nano initiative – action plan 2010“. Already today, nano structures are part of our every day life. Higher performance batteries or lighter and at the same time energy saving light sources are the result of nanotechnology. The expression "high-tech“ will be even more closely linked with innovations from the nano world in the future: nano medications will fight tumors more effectively; lighter, more stable and more diverse materials will provide more mobility, security and comfort. The newly conceived nanoTruck, under the motto „High-Tech from the Nanocosmos“ means that people can experience this future technology live. Catch up at the exhibition and the dialogue events in the nanoTruck and discuss nano applications and their benefits and risks with specialists!



The nanoTruck is at the heart of a BMBF campaign designed to promote dialogue between the world of science and the public. Following its launch at the end of January, the roadshow spent the next three months touring within Germany and participating in events connected with the German Technology Year 2004 initiative. Before Brussels, it had appeared at 29 locations and welcomed more than 35 000 people. By the end of 2004, it will have called at 95 different places on its resumed tour through the Federal Republic of Germany.

Some 60 m<sup>2</sup> of displays in the nanoTruck feature instruments that make atoms visible, vivid graphic panels and examples of high performance nanomaterials, nanobiotechnology, nanoanalytical devices, nanochemistry and nanofabrication. A hands-on programme includes guided tours through the exhibition, multimedia presentations, a laser show, and a play-and-win game on nanotechnology.

In conjunction with this initiative, a special brochure entitled Nanotechnology – Innovation for tomorrow's world has been produced, reflecting the same plain-speaking approach to the subject. The original German publication, prepared by the German Association of Engineers Technology Centre (VDI-TZ), can be obtained from the BMBF. An English version is already available from the European Commission Research DG. Translations into Czech, Danish, Dutch, Estonian, Finnish, French, Greek, Italian, Hungarian, Lithuanian, Latvian, Maltese, Polish, Portuguese, Slovakian, Slovenian, Spanish and Swedish are in progress.

In addition, a series of PowerPoint slides in German and English, suitable for use as teaching aids, can be found on the nanoTruck website.

The strong points of this initiative are as follows:

- Possible contact with a large public and not only with a public already informed and aware.
- Combine in a practical way scientific and entertaining aspects
- Action that goes beyond national frame

## **Recommendations**

As a conclusion to the study and to the analysis of the 3 actions given as example, it is possible to address the following recommendations:

- Promote incentive actions towards pupils in primary schools by offering scientific and logistic support to the teachers (example: "hands on science")
- Encourage research organisations in the area of nanotechnologies to directly or indirectly promote awareness actions based on leisure activities (example: "RVO" action)
- Support awareness actions toward a diverse public and based on practical experiments (example: "nanoTruck" action)
- Keep a significant part of research budgets for awareness actions towards youngsters.
- Promote meetings between youngsters and professionals working in industry and laboratories.

We hope that these recommendations may be useful to determine the future actions