TECHNOPOLIS

Identification and dissemination of best practice in science mentoring and science ambassador schemes across Europe

EXECUTIVE SUMMARY
Attaining the Lisbon and Barcelona objectives in terms of boosting investment in research will increase the demand for researchers. A key issue is, therefore, how to increase the number of young people entering science, engineering and technology careers. Studies shows that children's lack of interest in science is already manifest at schools (primary as well as secondary). Science Mentoring for children in primary and secondary schools aims to reverse that trend. By stimulating scientific interest of children from a young age, it hopes to ultimately increase the number of those choosing scientific training at university and pursuing scientific careers.

**Key concepts**

A *mentor* is a scientifically trained person providing advice and personal coaching to a student on a one-to-one basis or to relatively small groups of students in a highly interactive manner that is tailored to specific individual needs;

A *science ambassador* is a scientifically trained person who works with groups of students possibly within a classroom setting to stimulate and inspire their interest in science and to share his/her practical experiences of working in science as a fulfilling career;

*Young people* are defined as children attending primary and secondary school.

This study's first objective was to generate an overview of science mentoring and science ambassador initiatives across 33 countries in Europe through an inventory of existing mentoring and ambassador initiatives which responded to the minimum requirements of a) addressing school-age children b) involving direct interaction between children and scientists.

The second objective was to analyse the various forms of science mentoring being implemented across Europe through case studies of schemes selected for their exemplary value and draws lessons and propose guidelines for possible future developments.

The first phase of the survey identified 107 schemes potentially including activities of a mentoring or ambassador nature, involving the scientific sector and addressing school children. After reviewing these schemes, those not (or not yet) involving direct contact between scientists and children were eliminated. This left 56 relevant schemes in 26 out of the 33 countries surveyed. Further research was conducted through direct contacts with the organisers to build a more detailed picture of activities. A fact-sheet on of each of the schemes was compiled at the end of this phase.

Five main types of activities tend to act as vehicles for delivering mentoring and ambassador initiatives: science days/festivals; science centres; science promotion events; science clubs/camps; class room projects.

Most of the schemes offered more than one of these types of activity, with the most common activity being science-promotion and science days/festivals. In most cases, this refers to a science-week event-taking place either in the spring (April or May) or the autumn (October/November), or, for a smaller number of cases, a one-day initiative. Science promotion involving, for example, visits to R&D departments or labs, and class room activities, lasting several days to several months are also
frequently found. Only a few science centres were found which offered direct contact between scientists and children as part of their programmes of activity.

The gender dimension is in important in science as in other areas of society. All schemes address both genders except for two schemes, which address girls only. Most schemes, however, take the gender dimension into consideration either in the design, or promotion stage of their activities or collect data on participation differentiated by gender.

The launch dates of these schemes show that few are older than half a decade with most having been launched in or after 2000. Out of 56 schemes, 43 were launched between 1997 (one of the peak years) and 2005 and 30 between 2000 and 2005. No significant difference could be found between eastern and western Europe in the pace of development of mentoring activities.

In terms of resources, most schemes rely heavily on volunteers and only employ a small number of administrative staff on a salary. Most have limited regular source of funding, which largely originate from the public or academic sector. Private sector contributions are not frequent and only a minority of organisers seek such support.

Only two schemes are truly ‘nation-wide’ in their impact with most being small scale or at pilot stage. None have a regular formal evaluation procedure in place though most collect feedback from participants and contributors. The common opinion of those interviewed from the schemes is that, on the whole, the satisfaction level is high and the demand is often greater than what they can provide. Schemes run by universities with strong commitment at high level within the institutions appeared to be the most successful and more viable. The impact on the longer term objective of increasing the proportion of new students choosing science subjects is difficult to measure, in part because many schemes are too recent for participants to have reached that stage in their education. Despite the lack of evaluations, there is some evidence that mentoring and ambassador schemes have a positive impact on participants’ attitudes towards science – steadily growing numbers of participants in science festivals is one of the indicators supporting this.

Based on the case study evidence amassed by this study, the structure of successful schemes is built around three key features:

- a direct participation and personal commitment of the highest authorities in the academic institutions bringing direct access to policymakers and to their counterparts in the education sector and the regional or national administration necessary to quickly finalise co-operation agreements and remove administrative hurdles.

- a core team with the know-how, the expertise and the seniority level necessary be simultaneously a creative lab, a sounding board, and a management team along with the skills to network and mobilise others.

- Locating this core management teams of science mentoring or ambassador schemes in geographic, if not institutional, proximity to the research, educational or industrial partners from which mentors or ambassadors are drawn appears also to favour more active involvement of such ‘volunteers’.
The music tutor analogy for science mentoring and ambassador activities

A clear basic principle for successful science mentoring can be proposed using the analogy of different approaches to teaching music:

One option for stimulating children’s interest in learning music is to avoid at an initial stage to force them to learn how to read music but rather involve them in playing with different instruments under the guidance of a seasoned musician;

In a similar way, in science mentoring or ambassador, the aim should be to awaken the interest of children in the wonder of scientific discovery and the potential of science as a career path, without submerging them with scientific facts.

Any future policy aiming at supporting these initiatives should focus on the means of making these sustainable in the long term including securing funding for administrative and other running costs, formally acknowledging and rewarding volunteers and supporting the set-up of a formal appraisal and evaluation process.

Based on the findings, the study authors proposed three key strategic guidelines

- The need for a European level action plan for science mentoring and ambassador activities

Science mentoring and ambassador concepts are poorly understood and codified to date. An action plan at European level (potentially in the form of a communication with a broader remit on science education and mentoring for young people) with the aim of setting a number of common objectives for increasing the financial resources being devoted by public authorities to this area as well as stimulating a debate on key issues highlighted by this study.

- Avoiding reinventing the wheel by support for a European network of science mentor/ambassador practitioners and dissemination activities

The opportunities for trans-national learning from existing good practice cases is large and should be exploited through either a network (part funded by the Commission) or the launching of specific pilot projects on themes or techniques related to science education and promotion for children where existing science mentoring/ambassador programme managers could in turn ‘mentor’ emerging schemes in other countries or regions.

- Public funding for science mentoring and ambassador activities should be aimed at leveraging additional financial and human resources from the educational, research, charitable and corporate sectors.

The experience to date of science mentoring and ambassador schemes suggests that this is a field where a relatively small public investment can result in the mobilisation of significant resources (not always financial but also the in-kind contributions through time of scientists and industrial researchers). Even large and fully funded schemes such as the UK example are now recognising that there is a need to attract additional funding from non-public sources if the scheme is to continue expanding and attracting qualified mentors and ambassadors. In regions...
eligible under the Structural Funds, the use of EU funds to extend successful pilot or local examples of science mentoring to less-favoured regions should be explored.

The study concludes by proposing a number of operational guidelines for implementation of future science mentoring and ambassador schemes:

- They should ideally be based on a partnership of equals between the various actors involved at the implementation level (scientists and teachers for activities focusing on schools for example). Equally, all actors should ideally be involved or at least consulted in the design of the activities.

- Schemes should be built around a combination of ‘inspirational examples’ (the ambassador technique) and ‘active learning’ (processes rather than ‘exhibitions’, experiments or activities leading to a practical outcome, explaining technologies in their form as useful everyday applications, etc.) through mentoring.

- Schemes should take appropriate account of the need to increase the number of female researchers and of their potential impact on disadvantaged groups (ethnic origin and socially).

- Similarly, the social dimension needs to be reinforced in order to avoid focusing uniquely on ‘best performers’ (schools or children).

- Integration of mentoring activities by ‘real scientists’ into ‘science exhibition centres’, which tend to be staffed by non-specialists, could be another road to follow creating stronger links between these important tools for awareness on science and the actual scientific community.

- A European Code of Conduct for Science Mentoring and Ambassador schemes is required to ensure that children and young people participating to schemes as well as the adults acting as mentors or ambassadors are not placed at risk personally or professionally.

- Mechanisms for ‘rewarding’ mentors and ambassadors for the time they, generally, volunteer need to be included in schemes (e.g. a national prize for the ‘most inspirational scientist for children’).