

Kids and science

Tony Davies

External Professor, University of Glamorgan, UK

c/o Creon Lab Control AG, Europaallee 27–29, 50226 Frechen, Germany

Where are we going to be able to recruit scientists in the future?

No scientists = no spectroscopists.

Dick Wife, founder of the international pharmaceuticals screening chemicals company SPECS & BioSPECS NV, summed up our current position succinctly:

"World-wide there is the same problem – too few students wanting to study science and already too few qualified scientists to work in industry and academia. The situation is getting worse. Compared to other professions, becoming a scientist is not attractive to young people. They do not see beyond the 'white coat and laboratory' image, and no one tells them that science is fun to do, or that you can 'go anywhere' with science'." He went on "...kids today are not motivated to even consider science – it is bad, it is destructive and it is boring".

Dick also has a solution or at least the drive to move towards a solution proposing an initiative where "...kids are treated as equals, they are exposed to the magic of science, and its relevance in everything around them". He has set himself quite tough goals and has spent his free time in the last few years recruiting co-workers to his cause. This year the European Commission was successfully recruited and is funding a 12-month pilot project under the "Public Understanding of Science" banner.

The target group

This project aims at the so-called "zappers". Computer literate 12–14 year olds who will be entering the stage of making choices that will affect their entire lives. The intention of the project is to expose kids to the magic of science in the world around them. Not in the form of stiff curriculum-bound teaching material converted to a web-based format, but rather to concentrate on topics such as energy, food, materials, medicines etc. in a way that the kids can understand. *"The relevance of science to everyday life is essential in this project. Energy, plastics, colours, sound, smells, taste, food, water, health, even life itself can all become fascinating themes with the right teachers."*

The core of the project will be an Internet virtual community called

Kids&Science. Here the various topics will be covered in moderated discussion groups with school teachers from the first batch of recruited schools moderating individual topics within the general themes. The project will involve scientists, science teachers and science communicators in the interaction with the Kids.

In order to expose the kids to the reality of life as a scientist, enthusiastic exponents of our art have been sought around Europe prepared to offer some of their time in the chat rooms to share their experiences and motivation in becoming a scientist. It is hoped that by providing contact to these role models some of the negative image science suffers from can be counteracted.

The science village

The initiative is not limited to use of the Internet. It is planned to hold Science Villages where the kids can get together from various backgrounds for one week during the summer vacation. With the support of the various schools and their teachers, pupils will gather at a central location and Do Science!

Dick describes it better as *"The concept of Scientific Village, the meeting place where there is a very concentrated and direct contact between visiting kids and scientists, and where the kids are stimulated to design and work out their projects and experiments. Since the stay is not one or two days but a whole week the interaction between the kids, their teams and the scientists will be very intensive."*

So alongside a virtual science village there will be a real one. The current

project will test the approach in this pilot phase and derive best practices to be used from 2004 on the European scale.

The project team

There are three partners in the initial consortium, SPECS and BioSPECS NV (<http://www.specs.net>) who are the EU project coordinators and who have established the project management team in the Netherlands.

The main content providers and management is based around the Technical University of Vienna in the person of Professor Dr Johannes Fröhlich (<http://www.chemie.tuwien.ac.at/>). Finally, Creon Lab Control (<http://www.creonlabcontrol.com>) is responsible for hosting the Virtual Community.

Other projects: hands-on laboratories

Holger Jenett, another ex-member of the Institute of Spectrochemistry and Applied Spectroscopy in Dortmund is now working as the coordinator of a German BMBF project "Modell Teutolab" at the University of Bielefeld (<http://pc1.uni-bielefeld.de/~teutolab/>) where they are studying the hands-on laboratory for young children in Eastern Westphalia called Teutolab as a model to improve teaching in schools. Teutolab's programme spans those who have not yet had chemistry schooling, 8–12 year olds as well as older children in the 13–16 year-old category. Even



though the age range is significantly greater than the Kids and Science project the goals are similar. The Teutolab project is not the oldest initiative of this kind in Germany. The University of Oldenburg has one linked to teacher training, the technical high school Merseburg and the University of Mainz were early starters, the University of Göttingen runs such a project with Physics and Geo-sciences and the Universities of Stuttgart and Hohenheim have a joint venture in southern Germany.

Teutolab is run under Professor Dr Katharina Kohse-Höinghaus, professor of physical chemistry whose research interests are the study of complex reaction systems by physical chemical and especially spectroscopic techniques ... a long way from helping 8–12 year-olds understand science! Inside the Teutolab the children are expected to learn-through-doing, carrying out their own experiments in a fun atmosphere. The original Teutolab location could only handle around 100 school classes per year so even though thousands of children had benefited in the area the demand was around 10 times the supply so the Teutolab network was established in December to use the available capacity in secondary school laboratories to bring even more Primary school children to the experiments (see Figure 1).

The experiments

As an example of the content of the projects the smallest children work on the subject Paper & Ink, Lemons and Milk. In Paper & Ink the recycling of paper is covered, ink is prepared from tea and chromatography of felt-pen colours (“pictures that draw themselves”). In Milk there is a milk competition, plastic is made from milk and paints fabricated from curds! In Lemons the simple extraction and characterisation of the scent from the peel and also citric acid is carried out.

As the age groups get older the experiments become more complicated with the oldest group covering topics that include discussions about extraction of natural products as opposed to the synthesis of “nature identical” variants, the extraction of natural medications, their analysis and synthesis as well as “energy, the environment and analysis” where various fuels, waste gasses and exhaust clean-up processes are discussed.

Teacher training

Not only do the kids get their hands dirty but teachers also have opportuni-

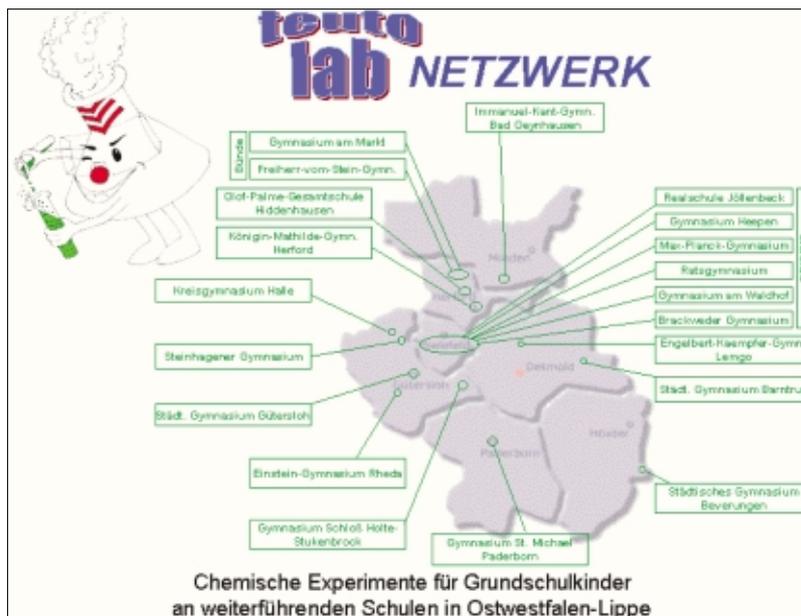


Figure 1. “Chemical experiments for primary school children carried out in secondary schools”. The demand far outstripped the capacity on the University of Bielefeld site so the network was established in December 2002 to try to meet this need.

ties in the lab. Here, however, the discussion quite often focuses on the applicability and transferability of a particular experiment to the school environment.

As mentioned briefly above, Teutolab is not alone. In Germany we are fortunate enough to have a good network of such pioneering laboratories with representatives in most states. Most have evolved out of the efforts of individuals in the more forward-thinking universities although it is good to see that more companies such as Aventis, BASF, Bayer, Degussa, Henkel and Schering with an immediate interest in changing attitudes in our kids have taken up the cause and realised that the odd open day is totally insufficient.

Conclusion

Well it is good to see that powers-that-be have finally realised the danger that faces our industrialised society by a generation of children whose fundamental opinion of the science by which we all live and which is the cornerstone of our health, wealth and happiness is negative. In Germany registrations for university level Chemistry courses has slowly picked up since the lowest levels in the mid to late 1990s. However, even if we don’t achieve record university graduate recruitment in the coming years with these projects at least we will have made a major contribution to producing a more “science literate” generation. Children who

maybe won’t know enough to understand some of the difficult, and often critical debates that will face them in the first half of the twenty-first century, but they should know enough to ask the difficult questions!

Further references

IUPAC initiative Committee on Chemistry Education (Peter Atkins chairman)
http://www.iupac.org/publications/ci/2003/2501/1_1_edu.html

Sir Harald Kroto
http://www.royalsoc.ac.uk/events/lec/Level2_final/Faraday.html
 Georges Charpak
<http://www.inrp.fr/lamap/reseau/accueil.html>

as well as the science centres:
<http://www.experimentarium.dk>
<http://www.exploratorium.edu>
<http://www.technorama.ch>
<http://www.deutsches-museum.de/ausstell/dauer/kimuseum/kimuse1.htm>
<http://www.e-nemo.nl>
<http://www.usc-bremen.de>
 (Thanks Holger for the links!)

PS The search for good examples
 Should you know of other excellent examples of such projects in your country we would be glad to hear of them. Please get in contact!
tony.davies@creonlabcontrol.com