

UK studies grapple with school science ...

Birmingham, England. Teachers and education researchers in Britain are preparing to carry out a top-to-bottom review of the school science curriculum in an attempt to address the question: what is the purpose of teaching science?

Two parallel consultation exercises are already under way to canvass ideas about a future science curriculum. In one, the Association for Science Education (ASE) is analysing the responses of many of its 20,000 members under an initiative called 'Science Education 2000+'.

A second project, 'Science Education for the Future', organized by the School of Education at King's College, London, and the Nuffield Foundation, was announced at the ASE's three-day annual meeting in Birmingham last week.

Science education in Britain has been reviewed several times over the past decade. It has been affected by a number of factors, including the revamping of the school-leaving examination taken at 16, compulsory tests during earlier years, a new national curriculum with specific learning targets and the introduction of compulsory science for primary schoolchildren.

But, despite the changes, "there has never been any real questioning of who science education is meant to serve", says Rosalind Driver, professor of education at King's College. There is a perception that present science curricula focus on acquiring facts — considered essential for a career in research — but not enough on the skills needed in non-research careers: analysis, investigation and a conscious awareness of the process of science.

The ASE consultation, the results of

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Recipe for science? Two projects ask what science should be taught, and to whom.

which are due to be published in the summer of 1998, asks fundamental questions, such as "what is science?", "why do science?" and "what science should be taught?". The King's College study, which is due to be completed at the end of 1998, will focus on the outcome of a number of detailed seminars and open meetings.

"The world of science is changing," says Mary Ratcliffe, chair of the ASE and lecturer in science education at the University of Southampton. "There is a lot of controversy — look at xenotransplants, for example — and more exposure to science in the making, such as life on Mars.

"We should be trying to prepare people to deal with these issues. Everyone does the national curriculum. But we now need to ask if everyone needs to do the same type of physics, chemistry and biology."

Examination statistics show a decline in the proportion of pupils specializing in the sciences after the age of 16. Yet most of those who reply to pupil surveys consider

the impact of science on their lives to be "very important", says Jonathan Osborne, a lecturer in science education at King's College. "This enigma needs to be resolved. "We need to ask what kind of science education will you design for the majority. Will there be one type, or more? And can we afford not to educate pupils to the highest levels of science and technology?"

The present curriculum, Osborne says, emphasizes 'classical' science. "But science increasingly is about uncertainty and risk assessment", and involves politics and economics. "Just look at issues such as BSE." Osborne adds that people need to understand the machinery of science, and how decisions are made that involve the interaction of science and politics.

Employers, too, appear keen on science education containing a portfolio of skills rather than the in-depth study of specialized topics. Mike Coles, a research fellow at the University of London's Institute of Education, has reviewed and carried out research on UK employers' requirements in science, engineering and technology education. In an address to the ASE meeting, he said that, with the exception of mathematics and physics, "employers and tutors in higher education want practical capability and application of ideas to problems to dominate qualifications, rather than simple recall".

One research group at Sheffield Hallam University is already beginning to put some of these ideas into practice. The Pupil Researcher Initiative, run by the Centre for Science Education, aims to provide pupils with an insight into current research through a series of structured activities.

Under a related scheme, 500 PhD students, known as 'researchers in residence', are sent to schools. The three-year, £1.1-million (US\$1.8-million) project is funded by the Engineering and Physical Sciences Research Council and the Particle Physics and Astronomy Research Council. It has recently been extended by two further years.

Five-and-a-half thousand UK secondary schools have been invited to join. In addition to carrying out experiments, pupils learn to write research proposals, interview scientists and contribute to journals. The objective, according to the project's deputy director Ken Mannion, is to show that science is not limited to standing behind a laboratory bench making measurements. "We try to show that science is complex, and involves the use of communication, time management and problem-solving skills."

The 'researchers in residence', according to the project's development officer, Marilyn Brodie, are encouraged to show pupils that "scientists do not have instant answers; that they need to look things up or, where necessary, acknowledge that there is no consensus".

Ehsan Masood

...as teachers try hand at research

Birmingham, England. The recent introduction of compulsory science teaching into British primary schools has had mixed impact on teachers. Although those with science backgrounds have had little difficulty in taking on the extra challenge, those lacking this background have often struggled to cope with unfamiliar ideas.

Some of the latter are now benefiting from a scheme run by Homerton College in Cambridge, and funded by the Gatsby Foundation, set up by the Sainsbury family, in which they are encouraged to undertake original research.

The aim of the 'Primary Teacher as Scientist' project, according to its director, Michael Reiss, is to "foster high-quality science education by raising the standard of primary school teachers' understanding of scientific processes".

Teachers select an area of interest and work on a research project with assistance from specialist researchers. Their findings are written up, and may even be published. One hundred teachers have signed up for projects such as why boys find overarm throwing easier than girls, and whether children suffer from seasonal affective disorder.

The teachers vary from those with no post-secondary science education to holders of postgraduate qualifications who never had the chance to pursue research. Jean McCallum, a teacher from Solihull in the West Midlands, says she became involved in order to help pass to children the experience of "doing real science". McCallum says the project has raised the profile of science among her pupils, as well as her own standing in the classroom.

E. M.