

Royal Society submission to the STEM Taskforce Science and Society enquiry.

The Royal Society welcomes the opportunity to submit evidence to the STEM Taskforce Science and Society enquiry.¹ A hard copy of all cited Royal Society reports will be forwarded to the Taskforce under separate cover.

Public attitudes to science

Evidence does not support the view that there is an anti-science and engineering culture in the UK, or that there is a crisis of confidence in science. For example, an OST/MORI (2005) survey showed 85% of people think science makes a good contribution to society (2% disagreed), and that on the whole, science will make our lives easier (82% agreed; 3% disagreed). An OST/Wellcome Trust (2000) report further revealed a high level of interest in science and an appreciation of the benefits it brings (for example, 84% agreed or strongly agreed with the statement 'Scientists and engineers make a valuable contribution to society'; 3% disagreed or strongly disagreed).

Therefore science *per se* is not of concern, but sometimes there is concern over *particular* STEM advances. This can have a major impact, such as in the case of agricultural biotechnology. When there is concern, then it is often over the speed of scientific and technological development, the uses to which science is put, and the ability of regulatory and institutional structures to keep pace with this change. Yet public opinion is dynamic, not static. The nature and degree of expressed support or concern is a complex matter but is related to perceived benefits and risks; ethical dilemmas; and the behaviour of government, policy and regulatory institutions, the media, and non-government organisations (NGOs). Government and political bodies, amongst others, therefore have an opportunity to work with public and other groups to develop responsible STEM policies and research trajectories.

The Royal Society's public dialogue work

Set against this background, the Society supports arms length, rigorous and structured public dialogue with science, technology and engineering on a case by case basis. Bringing together the public and scientists as well as civil society groups, NGOs and industry, issues concerning STEM can be explored and practical initiatives developed to help mitigate concerns or to respond to aspirations. The Society has undertaken innovative and effective public dialogue through its Science in Society programme since 2000. The outputs of these activities inform the Society's policy work, as well as that of other organisations.

For example, the far reaching and well received 2004 report by the Royal Society and Royal Academy of Engineering, *Nanoscience and nanotechnologies: opportunities and uncertainties*, successfully combined a technical appraisal of nanoscience and nanotechnology, an exploration of social and ethical issues, and public and stakeholder engagement. The report is contributing to the responsible development of nanoscience and nanotechnologies in the UK and internationally.

In another project by the Society, a cross section of the public, together with scientists, representatives from business, members of civil society groups, and NGOs came together to discuss and debate the implications of likely developments in information and communications technology (ICT). The subsequent report *Cybertrust and information security* (2004), noted that ICT was seen to be a major force for social good, but only one in five participants was confident in society being able to control the technology, and there was low trust in

¹ STEM Taskforce Science and Society – a call for evidence; www.iantaylormp.com/type2show.asp?ref=399&ID=90.

business and government to protect information. A watchdog to govern the use and storage of information by government and business was supported by three quarters of participants as the most effective way to develop trust in information security. This shows that practical measures for developing and supporting STEM can be explored through public and stakeholder dialogue. The report was welcomed by the Home Office.

Impact of our work on the public

In a further outcome of participation in the ICT dialogue process, participants left with an increase in interest in a wide range of scientific areas, an increase in trust in scientists, and were more likely to feel scientists wanted to make life better (see Appendix 1). Outcomes of this type can also come about through innovative science communication and science education. In addition to public dialogue for science policy and decision-making, the Society is committed to involving the public in learning about UK science, and equipping scientists with the skills and opportunities to communicate their science more widely. Appendix 1 shows the quantitative and qualitative impacts of some science communication and education programmes undertaken by the Society, as well from policy oriented studies such as the 'Dialogue initiative', measured against government Science and Society goals. For example, 80% of people who attended the Royal Society Summer Science Exhibition in 2004, our largest annual public event, left more interested in science, and 61% of student attendees were more interested in a science career. The Society's 'Acclaim' programme, designed to increase public recognition and appreciation of leading scientific research by distributing multi-media materials direct to schools, enthuses and excites young people about science and promotes the excellence of Britain's scientists and the quality of their work.

Impact of our work on science communication and public engagement policy

The key to learning about public views on STEM, as well as promoting an understanding of the role of STEM in finding solutions to society's challenges, does not, however, lie only in working directly with public groups. The Royal Society (2006) report *Factors affecting science communication* showed that whilst there is support amongst scientists for science communication, there are institutional barriers that need to be addressed for scientists and engineers who want to get involved in public engagement activities. Public engagement (public dialogue and science communication) was not seen as an important element of a researcher's career, and even thought by some to have a negative impact. The report recommended the introduction of policies that enable a higher proportion of scientists to get involved in public engagement; a more effective system of support and reward for those scientists; and better recognition of the benefits of engagement. The report also recommended better co-ordination between government, funding agencies, higher-education institutions and learned societies toward an agreed approach to public engagement on STEM and the desired scale of impact.

In response, HEFCE, the Wellcome Trust and the research councils have set up an £8m initiative 'Beacons for public engagement' which aims to promote excellence in public engagement and effect a culture change in UK academia towards engaging.² The Society itself is currently developing training and other support mechanisms for scientists who wish to undertake public engagement activities, and for scientists and engineers to engage with education.

Future challenges

Public engagement is increasingly being embedded within the Society's work, as is the case for other scientific organisations and for government. However it is still early days for this process and the challenges we all face include ensuring that the techniques of dialogue and communication are well understood and that the principles of public engagement spread progressively throughout the scientific community.

² www.hefce.ac.uk/Pubs/HEFCE/2006/06_49/.

References

OST/MORI (2005) *Science in society: findings from qualitative and quantitative research 2005*. Available at www.dti.gov.uk/science/science-and-society/public_engagement/public_attitudes/page12650.html

OST/Wellcome Trust (2000) *Science and the public: a review of science communication and public attitudes to science in Britain*. Available at www.wellcome.ac.uk/doc_WTD003420.html

Royal Society (2004) *Public dialogue on cybertrust and information security*. Royal Society: London. Available at www.royalsoc.ac.uk/downloaddoc.asp?id=1256

Royal Society (2006) *Survey of factors affecting science communication by scientists and engineers*. Royal Society: London. Available at www.royalsoc.ac.uk/downloaddoc.asp?id=3052

Royal Society and Royal Academy of Engineering (2004) *Nanoscience and nanotechnologies: opportunities and uncertainties*. RS policy document 19/04. Royal Society: London. Available at www.nanotec.org.uk/finalReport.htm

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Appendix 1

Royal Society Public Engagement Impact Assessment: Match against UK Government Science and Society goals

Goal 1 - Ensuring that all young people leave school equipped to engage with science as the active, informed citizens of the future	Success Measures		Comments (e.g. context, success, etc.)
	Qualitative	Quantitative	
<p>Partnership Grants scheme</p> <p>The Grants Scheme offers up to £2500 for teachers and scientists or engineers to work together on exciting and inspiring projects or activities involving students from 5 to 16 years old. Currently joint-funded by the DfES.</p>	<p>Independent evaluation of projects funded in 2002/3 reveals:</p> <ul style="list-style-type: none"> • 88% pupils increased interest/confidence in science • 59% pupils increased practical skills • 75% teachers extended creativity beyond curriculum • 47% of teachers gained new knowledge/skills • 67% of scientists gained insights into education • 66% of teachers planned to continue the project 	<p>Since the scheme began in November 2000 it has provided c. £500k to nearly 300 schools around the UK for projects that link them with scientists and engineers. Around 38,000 primary and secondary school pupils have been involved so far.</p>	
<p>Summer Science Exhibition 2004</p> <p>The Summer Science Exhibition is the Royal Society's largest public event. Comprises an annual selection of 20 exhibits of the best academic and industrial research and, uniquely, is staffed by the researchers. Students are targeted, as are educationists</p>	<ul style="list-style-type: none"> • 96% of the students enjoyed the exhibition • 80% were more interested in science • 72% were more aware of the reality of being a scientist • 61% were more interested in a career in science 	<p>2004 exhibition was attended by 1000 post-16 students from 50 schools Exhibition web site attracts 30,000 visitor sessions (1 million hits) per annum 340 educationists attended private view</p>	
<p>Genetic futures 2003</p> <p>Genetic Futures was a schools dialogue project to explore social, scientific and communication issues concerning advances in genetic science.</p>	<p>Independent evaluation shows:</p> <ul style="list-style-type: none"> • 92% pupils agreed/ agreed strongly that their knowledge of genetic science was improved • 96% were better informed about DNA related issues • 76% developed practical skills 	<p>Eight regional schools events, 1 National Forum, participation of 80 schools across the UK, 800 pupils, 20 scientists and 20 ethicists.</p>	<p>Partnership between the Royal Society, MRC, DfES, DTI, NESTA; BBSRC and Sheffield Hallam University</p>

Goal 2 - Raising public awareness, engagement and support for science and innovation.	Success Measures		Comments (e.g. context, success, etc.)
	Qualitative	Quantitative	
<p>Summer Science Exhibition 2004</p> <p>The Summer Science Exhibition is the Royal Society's largest public event of the year. The Exhibition comprises an annual selection of around 20 exhibits of the best academic and industrial research and, uniquely, is staffed by the researchers. The Exhibition is free to attend and open to all.</p>	<p>Questionnaire feedback</p> <ul style="list-style-type: none"> • 96% satisfaction with exhibits • 80% increased interest of science • 95% rated the Exhibitors' explanations highly or very highly. • 87% found the science very understandable. 	<ul style="list-style-type: none"> • 25 exhibits involving over 350 exhibitors • 4110 visitors over the 3 and a half days of the Exhibition (including the 1,000 students referred to in Goal 1 response), 46% increase on 2003. <p>Media coverage: articles in 4 broadsheets, tabloid, local and specialist newspapers. 15 instances of coverage on national and local broadcast media, including 7 BBC channels</p>	
<p>Public and prize lectures 2003-2004</p> <p>A programme of lectures aimed at a non-specialist audience. Events cover a broad range of subjects. Speakers include Fellows of the Royal Society and our own funded researchers, but also other renowned scientists and non-scientists from the worlds of art and literature</p>	<p>Public events survey</p> <ul style="list-style-type: none"> • 95% very enjoyable/enjoyable • 47% public lecture audiences had never been to the RS before <p>Prize lectures survey</p> <ul style="list-style-type: none"> • 93% very enjoyable/ enjoyable 	<ul style="list-style-type: none"> • 29 events • Average attendance per event 190 • 4 web steam events • Total web stream audience 13,000 in 30 countries <ul style="list-style-type: none"> • (web streaming now undertaken on a regular basis) 	
<p>Acclaim</p> <p>Acclaim is a national programme designed to increase the public recognition and appreciation of leading scientific research and the achievement of scientists in Britain today by distributing video profiles of scientists and CD Roms of curriculum-related work to schools</p> <p>(Directly Relevant also to Goal 1)</p>	<p>Sheffield Hallam evaluation showed that the majority of teachers responding agreed that using the materials:</p> <ul style="list-style-type: none"> • Enthuses and excites young people about science • Changes pupils' perceptions about the stereotypical images of scientists • Promotes the excellence of Britain's scientists and the quality of their work • Demonstrates important skills for scientists • Presents good role models for young people <p>QCA report shows that 12% of secondary schools use the material to explore the work of scientists</p>	<ul style="list-style-type: none"> • 1,000 videos, CD Roms or combinations of both have been distributed • 23,000 A4 flyers distributed via <i>Education in Science</i> journal in Feb 04, and flyers sent to Key Stage 3 consultants in all secondary schools in England in March 04. 	Developed in conjunction with Sheffield Hallam University

Goal 3 - Increasing public confidence in the government's use and management of science.	Success Measures		Comments (e.g. context, success, etc.)
	Qualitative	Quantitative	
<p>Dialogue initiative</p> <p>The dialogue is an annual initiative that engages groups of lay publics with specialists to discuss social and ethical implications of a topical S&T issue; it seeks to give the public a voice in policy-making</p>	<p>For 2004 Dialogue on ICT (Cybertrust)</p> <p>Independent evaluation shows:</p> <ul style="list-style-type: none"> 94% satisfaction - ease of understanding of issue 94% - satisfaction of opportunity for discussion 93% - satisfied quality of debate 98% re-attendance <p>Attitudes: Agree or Agree strongly with following statements before/after dialogue</p> <ul style="list-style-type: none"> Achievements of science overrated: 40% / 27% Public views should be taken into account: 79% / 84% People lack knowledge about science: 77% / 79% Decisions should be left to scientists: 38% / 35% Scientists want to make life better: 62% / 80% Media sensationalises: 44% / 65% <p>As a result of the dialogue, the RS has been invited to participate in policy discussions on Cybertrust and Crime by Home Office Minister, Paul Goggin.</p>	<p>For 2004 Dialogue on ICT (Cybertrust)</p> <ul style="list-style-type: none"> 3 regional meetings conducted, each comprising between 28-30 members of the public and 18 professional stakeholders. 1 Young Persons workshop conducted with 3 schools; 24 participants and 6 professional stakeholders. One national forum comprised 98% public participants from regional events. Total of 130 participants. Eighteen specialists involved in the programme, including technologists, scientists, social scientists, NGOs, businesses and arts groups. Wide media coverage, particularly national broadcast (eg Sky TV News, Channel 4 News, BBC News). 500 copies of report produced and disseminated to relevant groups, including CST, Foresight, HO, IAAC, ESRC, HP, RAND and others 	<p>The dialogue articulated with Foresight study on Cybertrust and Crime; HP Labs cooperated over Bristol events</p> <p>The 2004 dialogue built on exercises in 2003 on Genetics and Health – which resulted in the Government's White Paper on Health addressing the question of genome testing at birth – and in 2002 on Trust in Scientists - which informed the Royal Society's own practices</p>
<p>Government- commissioned study into nanotechnologies 2003 -2004</p>	<p>Very positive response received over the conduct of the study and its findings from the full range of stakeholders (industry through to NGOs) in the UK and abroad. The treatment of the potential health and environmental risks and the recommendations for regulation were welcomed. Lord Sainsbury and many others including the think tank DEMOS have referred to the study as a model for how scientists should examine the potential impacts of new technologies.</p>	<p>1035 members of the public (+15) surveyed</p> <p>Two workshops stratified by social-economic status (ABC1/ C2DE) held involving 50 members of public in London and Birmingham. Working Group included social scientist, consumer representative, NGO rep, philosopher.</p> <p>Evidence published on website</p> <p>Chapters on ethics and public engagement in final report</p> <p>Various chapters, especially that on the public attitudes survey, have been downloaded from our web site 20,000 times.</p> <p>800 people from abroad have requested copies of the report.</p>	<p>Conducted with the Royal Academy of Engineering</p>