

Science GCSEs: meeting the challenge of the 2006 reform

Report from a joint meeting organised by the Royal Society and the Association for Science Education, held at the Royal Society on Tuesday 21 April.

The opinions expressed in this report reflect those expressed by the participants of the meeting, and do not reflect the views of any one organisation or group.

1 Executive summary

A stakeholder meeting was jointly organised by the Royal Society and the Association of Science Education and held at the Royal Society on 21 April 2005. The **aims** were to:

- enable everyone present to be up-to-date on the changes that are taking place and why they are happening;
- agree an information strategy for schools, pupils, parents and Governors for the Summer Term (possibly further) to ensure that the *all* relevant people are equally aware of the changes ahead, confident about the decisions they will have to make in Autumn 2006 and are prepared for managing change;
- undertake an analysis of the professional development and resource needs of science teachers to support implementation;
- foster greater collaboration and co-ordination between individuals and organisations who will be providing the information, training and support over the next 18 months and beyond.

From discussion among around 60 participants from schools, training providers, resource developers, awarding bodies, industry, regulatory bodies and the science community, **four clear messages** arose:

- reform of Key Stage 4 science is ambitious, but with significant new opportunities comes significant change;
- capacity within the science education community to work together to support changes is unparalleled;
- although many different interest groups are involved, there is a strong willingness to collaborate;
- but there remains a potential for efforts to be wasted through complacency, divergent messages and some conflict of interest.

Through presentations, discussion and workshops came **priorities for a support framework for reform to Key Stage 4 science in 2006**.

- Promote informed choice equally among teachers and pupils, through a flow of accurate, up-to-date, timely and unbiased information targeted for a variety of audiences, but particularly school decision-makers.
- Ensure all school science staff are aware and confident about the purpose of change, and prepared for the decisions they will need to take over the coming year.
- Support shift in pedagogy, particularly with respect to embedding more discussion of controversial issues, and use of contemporary science, in the classroom and interpreting, integrating and assessing 'How science works'.
- Co-ordination and co-operation of information and support, particularly provision of training to meet specific and generic needs through partnership between key CPD providers including the Science Learning Centres, ASE, Specialist Schools Trust, LEAs, Secondary National Strategy TTA etc. are key. This will enable different models of CPD to be made available to teachers throughout England, so allowing the many different needs to be catered for.
- Encourage greater engagement from employers to support work placements and work-related learning – such as providing advice on planning and management and external speakers, and establishing industry days. Therefore organisations who represent the science community and employers need to be informed of the changes, and, where appropriate, direct investment in resources development and other activities in ways that will support GCSE science reform.
- Recognise and build on existing good practice and high-quality support to give teachers greater confidence in new teaching and learning approaches.
- Examiners will need to be properly trained to set and mark appropriate assessments in line with new GCSEs.

It was agreed that if these priorities were not met, the greatest risk is that inadequate or fragmented information in the short timescale available will engender negative attitudes towards change, and undermine the advantages of reform. It may also affect progression into science post-16 and could lead to teachers over-relying on the awarding body specifications in the absence of schemes of work. Moreover, changes to Ofsted inspection regime may make it difficult to monitor the impacts of changes to Key Stage 4.

There was a strong agreement that progress in developing this framework relied on a great many individuals, but **recommendations for key organisations** emerged from the workshops.

- The communications strategy needs to be co-ordinated and phased to ensure high-quality, equal coverage and expert targeting. This will require co-operation between organisations and networks who already have plans and a responsibility to support reform, should set high standards in communications and marketing, and involve a combination of media including leaflets, presentations, websites, in-school meetings, articles in newsletters/journals, helpline, email enquiry service, and posters. It may help to map target audiences through particular communication routes.
- Sources of information and any vested interests they might have should be clear.
- The DFES should ensure that all schools have and use funding to enable science staff to receive necessary training.
- School management teams should be expected to show how they will allocate time and money to relevant CPD for science staff, possibly through School Improvement Plans.
- NAIGS and the Secondary National Strategy should ensure that each LEA, and therefore every school, has equal access to advice and support on KS4 science issues.
- Provision of training to meet specific and generic needs should be co-ordinated through partnership between CPD providers including the Science Learning Centres, ASE, Specialist Schools Trust, LEAs, Secondary National Strategy TTA etc.
- Ofsted should monitor the quality of KS4 science teaching, and uptake of science post-16, before and after introduction of the new GCSEs.
- Professional bodies, resource developers and employers who have a role in science education should be aware of and lead partnerships which will support reform.

Although participants were positive about the ability of the science education community to meet these challenges, they were clear that the **risks of complacency or lack of co-ordination** at this stage could be significant. Such risks included:

- undermining the outcome of the planned review of the Key Stage 3 science curriculum;
- increasing inequalities between schools, teachers and pupils particularly with respect to available resources and experienced staff;
- causing the failure of KS4 reform to reach its potential because of inadequate information, confidence and skills in new teaching and learning styles;
- bringing unnecessary costs to schools if existing textbooks, equipment and other resources are not made best use of;
- decreasing morale among science teachers;
- deferring decision-making due to lack of adequate information impacting on career planning and timetabling;
- increasing in numbers of students only taking one science GCSE;
- causing confusion in schools if different staff are receiving different messages regarding changes to GCSEs;
- affecting student choice and inhibiting school innovation by not sufficiently engaging parental and governor support;
- dominating influence of market forces rather than student need.

2 Background

In December 2004, the Royal Society, Association for Science Education and other professional bodies met with the Qualifications and Curriculum Authority to discuss the challenges of Key Stage 4 science reform. At this meeting it was agreed that greater clarity was needed regarding how teachers and others in schools were going to be adequately informed and supported in the decisions they would need to make regarding the new science GCSEs. In response, a stakeholder meeting comprising presentations, discussion and workshops was jointly organised by the Royal Society and the Association of Science Education and held at the Royal Society on 21 April 2005. Participants included teachers, educationalists, publishers, training providers, industry representatives and policy-makers.

Timetable for change is as follows:

Autumn 2004	New Programme of Study for Key Stage 4 science in 2006 published
Autumn 2004	QCA produces criteria for new GCSEs to be developed
February 2005	14-19 White paper published
April 2005	Awarding bodies develop and submit specifications to QCA
Summer 2005	QCA decide on accreditation of new GCSE courses
Summer 2005	Workshops at ASE regional events and introductory days on new GCSE courses from awarding bodies
September 2005	Finalised specifications sent to schools along with guidance from QCA
September 2005	Briefing events at a number of Science Learning Centres, led by QCA, HMI and the Secondary Strategy
September 2006	New GCSE science courses start for Year 10

3 Informing and enthusing about change

3.1 Mark Orrow-Whiting, Science Consulting Team, Qualifications and Curriculum Authority (QCA)

QCA has led curriculum and assessment development and piloting since the last curriculum change in 2001. The aim has been to ensure science education is relevant, creative and innovative, includes key knowledge and skills, and meets the needs of all young people. The work has included:

- research into the nature of scientific literacy and its assessment;
- a new curriculum and flexible qualifications framework for GCSE;
- a pilot suite of GCSEs to test the new flexibility, called Science for 21st Century; and
- a new Programme of Study (PoS) for Key Stage 4 (KS4) presenting key knowledge, skills and understanding to enable courses to incorporate contemporary and relevant contexts to excite all young people.

As a result, the following changes will be in effect from September 2006:

- revised PoS suitable for all (no disapplication);
- common PoS equivalent to a single GCSE;
- new statutory entitlement for all students to study science programmes leading to at least two GCSEs; and
- new range of Science and Additional Science courses to suit the needs of individual students with a range of approaches (eg scientific literacy, work-based, 'pure').

All specifications will include details of appropriate progression, and while current routes will be clearly sign-posted, there will also be a wider range of possibilities. The diagram following shows some examples of possible progression routes:

KS4	Science Entry level Pass	Applied Science Double award GCSE Grade A-C	Science C21 st GCSE Grade A-C	Science + Additional Science Grade D-G	Bio, Phys, Chemistry GCSEs Grades A-C
	↓	↓	↓	↓	↓
KS5	Science BTEc National level 1	Science AVCE	'Perspectives' GCE AS	NVQ Level 2	Phys, Chem Psychology GCE A

Innovating across science GCSEs from 2006 has created opportunities to address issues of:

- assessment of 'how science works' (coursework);
- e-assessment, oral assessment, group work assessment;
- nature and purposes of practical work;
- distinctiveness of scientific enquiry;
- range of progression routes;
- attitudes of students; and
- different 'flavours' of science to meet the range of student need and interest.

For QCA, the main issues regarding implementation are:

- guidance on the changes;
- preparing senior managers;
- training teachers (initial and on-going);
- training technicians;
- supporting teachers and technicians;
- training examiners and assessors; and
- resources.

3.2 Marianne Cutler, Director of Curriculum Support, Association for Science Education (ASE)

Current levels of knowledge and confidence regarding changes to Key Stage 4 science are varied among teachers. Feedback from ASE members shows questions arising regarding:

- what is legally required as statutory entitlements for students at KS4;
- changes to assessment and coursework;
- vocational courses, and meeting the needs of the less able;
- what to do next and when.

For teachers, the most important factor determining the choice of which specification to offer KS4 pupils will be how best to meet their need. But to make that decision they need to feel familiar with the choices on offer, and confident and experienced in delivering them. Which are the key points to consider?

3.2.1 Assessment

- Proportions of external and internal assessment (including oral and group work).
- Emphasis on coursework.
- Use of e-assessment and other innovations to look at understanding and application of 'how science works'.
- Confidence of staff with internal assessment.

3.2.2 How science works

- Opportunities for innovative practical work.
- Emphasis on implications of science – scientific ideas, ethical issues.
- How courses will remain fresh and contemporary.
- Resources and CPD support offered.

3.2.3 Progression routes

- Progression routes must be clear and relevant to the students involved.

3.2.4 Work-related experience

- Work-based courses must be clearly supported with resources and experience opportunities for students.

The ASE have been active in circulating FAQ regarding change to Key Stage 4 science and these have been extremely popular with over 500-600 downloads each month. Articles and news will be included in both the June and September issues of the ASE journal *Education in Science*, and area meetings throughout June/July 2005 will be an integral part of informing ASE's service to its members and others.

3.3 Plenary discussion – key points

3.3.1 Change in progression routes and greater diversity of choice will put pressure on providing better careers advice to young people.

3.3.2 Change in curriculum models will affect timetabling and therefore becomes a whole-school issue. This may result in sequential rather than parallel GCSE provision, which could increase drop-out after year 10. Ofsted should keep a keen eye on schools whose proportion of KS4 pupils doing only one science GCSE drops from 2006.

3.3.3 The QCA guidance booklet being sent to all schools in the Autumn term will be crucial in informing and persuading senior managers, particularly if it restates the statutory entitlement, commitments from the Government's 10 year framework and enthusiasm about the range of careers open to young people with a good science qualification. This booklet will include the whole range of curriculum models and exemplify possible pathways. It might benefit from wider consultation and the advice of a communications expert to ensure it will be most effective. Dissemination should also be as wide as possible (at the moment it will be 3 copies to each school: Headteacher, Head of Department, another member of staff).

3.3.4 The benefits of reduced content, including freeing up teachers' time, need to be weighed against the risk of widening the gap between GCSEs and A/AS levels.

3.3.5 Decision-making regarding curriculum models and specifications will take place at various times in schools, but for most, as soon as possible after the new specifications arrive in schools in the Autumn term 05.

3.3.6 The needs of the less-able pupil in mainstream schools, but particularly SEN pupils in special schools, should also be taken into account. For example, OCR are revising all entry level science to Grade G -2, and ensuring progression into Foundation stage.

4 Recommendations from Workshop 1 - getting the right information to schools

Summary of recommendations arising from discussion, given in order of urgency, are listed below. Needs identified in bold, followed by suggested actions.

4.1 **All school science staff to be aware and confident about the purpose of change, and prepared for the decisions they will need to take over the coming year.**

- Comprehensive communication strategy, to include: ASE regional meetings and website; briefing meetings being held by awarding bodies; information leaflets and letters sent to all schools from an independent source (e.g. ASE and Royal Society); articles in SLC newsletters; phone helpline and email answer service; Teacher TV; TES and national media; staffroom posters; dissemination through other networks e.g. professional bodies, SETNET.
- Headteachers, curriculum managers and bursars to be sent letters outlining implementation timetable, legal requirements of schools in providing statutory entitlement to 2 science GCSEs, enforcing the need for time to be created for science departments to meet, talk and plan for change, and include supportive quotes from key people such as HCMI, senior scientist, etc.
- Creation of a real/virtual 'shop-window' of choices available to schools and central point of access to support/resources.

4.2 **All school science staff and decision-makers given up-to-date, accurate and unbiased advice to enable them to select GCSE specifications on the basis of what is most appropriate for their pupils as well as manageable within their school.**

- Guidance booklet being produced by QCA should include descriptive information on all the available specifications, advice on selection and managing change, highlight particular issues such as progression routes and showcase good practice through a few case studies. This should be followed by regular updates and supported by a helpline and/or email enquiry service. Dissemination of this booklet should be as wide as possible, and its use supported by all relevant organisations.
- All Heads of Science to be offered a free day of training, ideally through the SLCs and perhaps in conjunction with a Secondary Strategy consultant.
- NAIGS, the Secondary Strategy and Ofsted to work together to ensure LEA consultants and HMI are equally informed and briefed for school visits.
- Peer support and training considered as a mechanism for embedding good practice.
- A CD-Rom with interactive presentations could be an effective tool for generating departmental discussion about managing change and support effective planning.
- Discuss with the TES opportunities for editorial within the September Science supplement.

4.3 **Pupils who will be choosing GCSE options next year, and their parents, to be able to make the right choice given their abilities, aptitudes, interests and career aspirations.**

- Leaflet emphasising the importance of science GCSEs and written specifically for parents and governors, encouraging them to engage with pupils and school staff. Supported by articles in schools newsletters, dissemination through networks such as the PTA, National Association of School Governors, TES Governors' Information Network, Governornet and in Governor training days.
- Leaflets and school posters for students encouraging them to think about the choices available related to progression routes they might take. Supported by banner adverts on popular websites e.g. BBC and through the development of the Science Council's careers website.
- Booklet and powerpoint presentation created for schools to use at options evenings during January/February 2006.

4.4 **Organisations who represent the science community and employers need to be informed of the changes, and, where appropriate, direct investment in resources development and other activities in ways that will support GCSE science reform.**

- Articles in newsletters of professional bodies, learned societies and sector skills councils.
- Briefings for organisations who link scientists with schools, such as SETNET, Researchers in Residence and the Royal Society, so that these ambassadors are aware of the changes are able to engage young people in discussion about their options, and in issues directly relevant to some of the new aspects of GCSE specifications such as contemporary science, how science works, and work-related issues.

- 4.5 **Networking with other relevant stakeholders such as resource developers, careers teachers/Connexions Advisers, university admissions tutors, FE colleges and others in the Learning and Skills sector, independent schools, Regional Development Agencies, etc.**
- All these audiences should be considered as part of any overarching communications strategy.

5 Supporting implementation

Presentations were received from the following people:

- Jennifer Burden, Twenty-First Century Science Project
- Mary Ratcliffe, Science Learning Centre South East
- John Commerford and Beverly Cox, AQA
- Sue Howarth, Edexcel
- Mary Whitehouse, OCR
- Janet Jones, WJEC

Their presentations are available on request from the ASE, but the following support needs were identified in relation to features of the new specifications awarding bodies are planning:

- changes to assessment;
- incorporating 'How science works' into teaching and learning and using new support materials;
- progression from Key Stage 3 in into post-16 study;
- using more and better practical work to increase pupils' engagement in science;
- reduce content but ensure smooth progression to GCE AS Science qualifications;
- maintaining the number of students taking two science GCSEs;
- enabling teachers to manage a greater amount of flexibility and choice;
- adequately reaching all schools with information and support, especially the small ones where the number of teachers involved make it less cost-effective for a visit;
- encouraging teachers to reconsider their approaches to subject content and have confidence in change.

5.1 Plenary discussion – key points

- 5.1.1 Seek out, recognise and share existing good practice among teachers and good quality support material – avoid assuming that teachers do not already use many of these 'new' ideas and techniques.
- 5.1.2 Only about 50% of LEAs currently have dedicated science advisors – it is important that all 100% have a science advisor or strategy consultant who can have local support for KS4 reform.
- 5.1.3 Financial implications of getting teachers out of school to attend meetings/training must be considered and resolved.
- 5.1.4 Services such as helplines and email enquiry services are useful for providing background support.
- 5.1.5 Involve the Initial Teacher Training community as much as possible to ensure new teachers will be already be equipped with the necessary knowledge and skills.

6 Recommendations from Workshop 2 - identifying and meeting the needs of teachers

Summary of recommendations arising from discussion, given in order of urgency, are listed below. Needs identified in bold, followed by suggested actions.

Generic:

6.1 Teachers and technicians given sufficient entitlement to specific KS4 science CPD.

- All schools required to show how their science staff will receive necessary CPD in their School Improvement Plans (being written now for 05-06 year).
- Leading role for the Secondary National Strategy in offering CPD in pedagogy, and in ensuring each LEA has at least one person with the expertise to deliver.
- DfES require all schools to set aside one of the 5 INSET days for subject-specific CPD.

6.2 Adequate funding for schools to enable teachers to receive professional development, including off-site training.

- Realistic assessment of minimum level of funding needed within schools.
- Advice for Headteachers/bursars on managing existing budget to finance teacher training/resources.
- Ring-fenced additional funding provided by the Treasury.

6.3 Opportunities for peer/team discussion with input from experts, and time for individuals to reflect on their own practice and needs.

- Availability of local LEA/strategy consultants to attend school department or cluster meetings.
- Mentoring programmes to enable those already demonstrating relevant good practice to share their knowledge and build confidence in others.
- Capitalise on free-time of KS4 teachers around exam period when they are not required to invigilate.

6.4 Co-ordination of support to ensure all teachers have equal opportunities, and market forces do not lead to gaps. Must be balance between generic and specific training, the latter being offered by awarding bodies in relation to their own specifications.

- Central management by a national body, advisory group or dedicated individual. RS, ASE and SLC key players.
- Establishment of a formal partnership between the main CPD providers.
- Discussion with ITT providers regarding appropriate provision within teacher training courses.

6.5 Different models of CPD made available to teachers throughout England to allow the many different needs to be catered for.

- Accurate diagnosis of needs based on Key Stage 3 audit, and assessment of the capacity of the network of providers to meet that need.
- Audit of planned CPD provision by the Science Learning Centre network and development of courses to fill any gaps.
- Co-ordination between the providers of CPD e.g. SLCs, ASE, Specialist Schools Trust, LEAs, etc.

6.6 Quality assurance of existing/new resources and training.

- DfES to build relevant questions into Key Stage 3 review to enable valuable lessons to be learned.
- Identify current leaders in certain areas e.g Wellcome Trust on ethical issues in science education.

6.7 System-wide provision of information and support ie inclusion of learning and skills sector due to role of FE colleges in 14-19 education, and the independent sector.

- Involvement of stakeholders from the LSC and independent sector in further discussion and planning.

Specific:

6.8 Support for changes to coursework.

- Off-site course enabling significant exploration of ideas and exemplars, preferably for whole department, with follow-up support through local advisors and website to enable embedding class.

6.9 New pedagogy, especially classroom discussion.

- Production of video clips showing good practice.
- Opportunities to share and experiment with ideas.
- Identifying teachers already confident in key areas and using them as mentors.
- Discussion needs up-to-date and relevant resources to draw from.

6.10 Understanding and feeling confidence in new methods of internal assessment is crucial for all teachers.

- Helpline/email enquiry service.
- In class/in department CPD from local advisors and ASTs, Feb – March 06.
- Exemplar material and case studies.
- Clarity from awarding bodies regarding the technical advice they give teachers and what the outcomes of any training offered will be.

6.11 Guiding pupil choice – support needed for teachers, Heads of Year, careers teachers and parents.

- Relevant careers information prepared for options evenings in Feb 06.
- Enhanced links with industry through EBPs, SETPOINTS.
- Dedicated website.

6.12 More effective use of ICT for trainee teachers, science, teachers, technicians, support staff and school ICT co-ordinators.

- Range of support materials including: web-based support, Teacher TV, CD-Roms.
- Opportunities for hands-on exploration of new technologies.
- Shadowing expert peers.
- Implemented through 2nd wave of New Opportunities Fund training.
- Integrate with DfES E-learning strategy.

6.13 Embedding contemporary science in the classroom, and ensuring access to and use of 'contemporary science' resources eg Demox materials.

- Widespread links with industry and research institutions to give schools direct input on modern science, supported by related, regular CPD. Role for SETNET, SLCs, professional bodies and industry.
- Awarding bodies to be aware of the range of resources already in existence and to highlight them in their materials.

6.14 Innovating in practical work – specially for technicians – particularly relevant for applied science.

- Update Royal Society equipment list and ensure equipment suppliers/publishers are aware of change in needs.
- Dedicated sessions at ASE Technicians conference.
- CLEAPSS to look at Health and Safety advice.
- Good practice in video clips and Teacher TV.
- In-school support.

6.15 Social and ethical issues in science.

- Packaging up good examples already in existence from organisations like the Wellcome Trust, and outcomes of the 21st century science pilot, to send to all schools in Autumn 06.

6.16 Work placements and work-related learning – advice on planning and management, use of external speakers, establishing industry days.

- Paper guidance including 'top tips' produced by bodies such as SEMTA/LSDA/SSE/SETNET.
- Input from key companies such as GSK.
- Tie-in to enrichment courses provided by SLCs.

6.17 Building expertise among examiners to be prepared for new styles of assessment.

- Co-ordinated strategy between awarding bodies, National Assessment Agency and Science Learning Centres.

6.18 Managing increased flexibility, change and making informed choice from among awarding bodies' specifications (particularly important for Heads of Science and Senior Managers).

6.19 Interpreting, integrating and assessing 'How science works' and new approaches regarding 'issues-based science'.

6.20 ICT, risk assessment and new teaching methods (for technicians).

7 Appendix

Science GCSEs: meeting the challenge of the 2006 reform – a joint meeting organised by the Royal Society and the Association for Science Education, held at the Royal Society on Tuesday 21 April

Attendees:

Dr	Catherine	Aldridge	SLC, South West, At-Bristol
Ms	Sharmila	Banerjee	British Association
Dr	Derek	Bell	Association for Science Education
Mr	David	Bevan	Manningtree High School
Ms	Elsbeth	Boardley	Oxford University Press
Ms	Sue	Bull	SLC, East Midlands, University of Leicester
Mr	Phil	Bunyan	KS3 Science Strategy
Ms	Jenifer	Burden	Science Education Group
Mr	John	Coad	Pfizer
Mr	John	Commerford	AQA
Mr	Beverly	Cox	AQA
Ms	Marianne	Cutler	Association for Science Education
Ms	Debra	Dance	Department for Education and Skills
Ms	Chantelle	Dawsmith	Southgate College
Dr	Chris	Everall	Drayton Manor High School
Mr	Adrian	Fenton	Association for Science Education
Mr	John	Groves	Immersive Education
Mr	Nigel	Heslop	Association for Science Education
Professor	John	Holman	National Science Learning Centre
Ms	Sue	Howarth	EDEXCEL
Ms	Pauline	Hoyle	KS3 Science Strategy
Mr	Andrew	Hunt	Nuffield Curriculum Projects
Ms	Janet	Jones	WJEC
Ms	Julie	Jordan	SLC, Yorkshire & the Humber, Sheffield Hallam University
Ms	Emma	Kemp	Royal Society of Chemistry
Mr	Chris	King	SLC, West Midlands, Keele University
Dr	Anil	Kumar	Engineering and Technology Board
Ms	Katie	MacKenzie Stuart	Hoddar Murray
Dr	Jane	Maloney	SLC, London, Institute of Education
Mr	Paul	McLeod	Department for Education and Skills
Ms	Jessica	Meller	ABPI
Mr	David	Montagu	Royal Society
Ms	Annette	Montague	Specialist Schools Trust
Ms	Gopali	Nagi	Villiers High School
Mr	Malcolm	Oakes	Association for Science Education
Ms	Cally	Oldershaw	Earth Science Education Forum
Mr	Mark	Orrow-Whiting	Qualifications and Curriculum Authority
Dr	John	Oversby	University of Reading
Ms	Ginny	Page	Royal Society
Mr	Bob	Ponchaud	Consultant
Dr	Sally	Preston	SLC, North East, University of Durham
Mr	William	Quaye	Mill Hill County High School
Mr	Phil	Ramsden	Association for Science Education
Professor	Mary	Ratcliffe	SLC, South East, University of Southampton

Dr	Alison	Redmore	SLC, East England, University of Hertfordshire
Ms	Kay	Roberts	GlaxoSmithKline
Ms	Nicola	Russell	Liverpool LEA
Mr	Daniel	Sandford-Smith	Institute of Physics
Ms	Chloe	Sheppard	Royal Society
Mr	Mehar	Brar	ASE London Region
Ms	Liz	Singleton	Centre for Learning Excellence (14 - 19 Education)
Ms	Sue	Sissing	London Borough of Harrow
Dr	Amanda	Smith	SLC, North West, Manchester Metropolitan University
Ms	Denise	Smullen	Specialist Schools Trust
Ms	Corinne	Stevenson	Dept for Lifelong Learning
Ms	Hannah	Strange	Notting Hill and Ealing High School
Dr	Fani	Stylianidou	SLC, London, Institute of Education
Mr	Mike	Terry	Alexandra Park School
Mr	Nigel	Thomas	Royal Society
Ms	Jenny	Versey	Education Consultant
Ms	Mary	Whitehouse	OCR