

Bristol ChemLabS Outreach Report Web Version 2015-16

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1. Overview

Bristol ChemLabS Outreach engaged with more than 32,600 people in the last academic year. These include 16,700 in primary schools, 14,200 in secondary school and 1,700 members of the wider community. The number of participants is a conservative estimate because accompanying teachers at events are not always recorded; actual numbers engaged with will be higher. As it is, the total exceeds the typical average for recent years of between 25,000 and 30,000 participants. In total, 254 events were organised and delivered during the year; some other events were organised but were cancelled by external bodies.

Bristol ChemLabS Outreach has continued to work with and in collaboration with a number of external partners to help in delivering outreach programmes. These include established partners, such as the Royal Society of Chemistry, The Salters' Institute and the Higher Education Funding Council for England, as well as commercial sponsors such as EDF Energy.

The appendices provide further details of some individual outreach activities. However, it is appropriate to include in the main body of this report a summary of some high-profile externally funded activities. Comments from participants are included to demonstrate the impact and value of the activities. Further details of specific activities are included in the appendices.



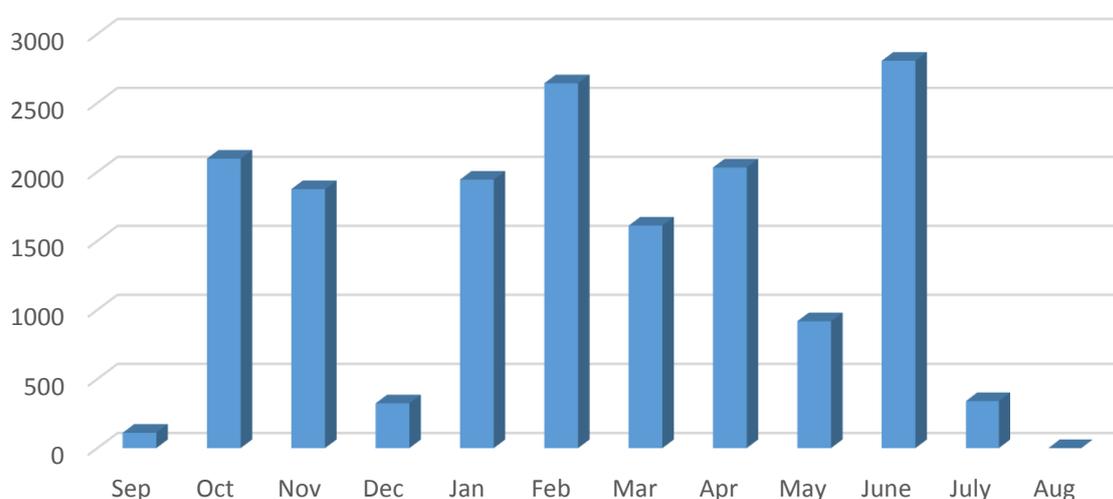
2. Outreach Activities

Primary Outreach

During the last academic year, there were 79 primary events involving 348 different schools and 16,700 pupils and teachers. These included nearly 15,000 pupils and teachers who saw a science assembly such as *Gases in the Air*, 1150 Key Stage 2 pupils who engaged in hands-on practical workshops, 180 pupils who had experience of practical work through the library of loan equipment, 81 pupils from two schools in London and in Devon who visited the School of Chemistry to perform practical work in the laboratories and 142 primary pupils who engaged in other activities.

Work with primary schools is expected to increase in the next academic year, through funding from the Primary Science Teaching Trust.

Primary Outreach Numbers Per Month 2015-16



"I just wanted to say an enormous thank you for coming into school today for what was clearly a brilliant assembly! You really did go out with a BANG!! You had all the children eating out of the palm of your hand by the end. To have over 200 children completely transfixed throughout 1 hr and 10 mins is a mighty achievement!"

"The children at Four Oaks Primary still talk about the fantastic demonstration that you did for them eighteen months ago."

"The experiments had the children fully engaged; it was so nice to see children from year 1 to year 6 showing such interest in Science. Your delivery was wonderful; the assembly was interactive, stimulating and fun. It isn't possible to show the children an array of experiments as you did, without access to the equipment or the specific expertises, although wouldn't it be wonderful if we had dedicated science teachers in all primary schools as they do in secondary schools? There was a real buzz in the playground after your assembly, those children who already had a love for science have had that love amplified and those unsure of the subject are now excited by it and less fearful. I hope that we can build on this and I as a teacher feel enthused and ready to boast the status of Science."

"The assembly and following workshops were fab! The children were excited and engaged and were talking about it using the correct scientific vocabulary all week."

I heard so many conversations at playtimes and in the corridors about hydrogen exploding, never mind in lesson times! It was great to see all the children using chemicals and having experiences we might not be able to present them with in the usual realms of primary school. They loved wearing the lab coats and glasses and feeling like real scientists. I would definitely recommend a Chemlabs assembly and workshops to any school wanting to raise the profile of science or kick start a science week, as we did. It was a total hit with the children and staff were wowed too and ready to take the children forward with science learning for the rest of the week. A massive thank you to the Chemlabs team who worked with us! Thanks for a great WOW start to our science week!"

Secondary Outreach

During the last academic year, 417 schools were involved in Bristol ChemLabS Outreach activities, engaging with 14,156 students and teachers in 131 events. The majority of students were Key Stage 4 and Post 16 rather than Key Stage 3, coming from counties south of Birmingham.

A total of 9310 students and teachers saw the lecture demonstrations *A Pollutants Tale* and *A Chemical Delight* in demonstration-only events. Of the workshops and activities held in the School of Chemistry, 477 students enjoyed caffeine extraction workshops, 381 benzocaine workshops, 169 polymer workshops, 375 in spectroscopy tours, 1150 through various schools conferences and 146 in competitions. Many of the students also attended lectures and lecture demonstrations by postgraduate chemistry students. In addition, 207 students were involved in a number of residential chemistry camps. A total of 1069 students engaged in Spectroscopy in a Suitcase activities run in partnership with the Royal Society of Chemistry.

Bristol ChemLabS also contributes to residential schools organised by University of Bristol's Widening Participation Office including those associated with Access to Bristol courses and with the Sutton Trust. There has also been a rise, which is expected to continue, in requests for visits made in support of BTEC science courses. These do not involve practical work but do involve laboratory tours, talks and departmental tours.

"Thank you very, very much for the most excellent show last week. I have never ever seen anyone do a whizz and bang type of science show before where they properly explain to the children in language that they can understand and use, exactly what is happening. Amazing. Shows it is possible, and people like [named commercial groups] should hang their heads in shame. The children really, really loved it and learned masses (and it was excellent CPD for the staff too) and we will all remember it for a long time."

"In September last year you obtained some funding and were able to come to our school to give a really good chemistry talk/demo to our Year 11 students. After Maths, the most popular choice of A Level subject in our school was Chemistry. I have no doubt that your talk supported the interest of boys in studying Chemistry at A Level – we will have 4 A Level Chemistry groups in year 12 next year."
Dr Emma Baker, Director of Science and Head of Chemistry. Bishop Wordsworth's School, Salisbury (August 2016)

International Outreach

International Chemistry Camps

Bristol ChemLabS Outreach provides several residential 2, 3 and 5-day chemistry camps throughout the year. These take place in January, at Easter and in the summer term, when the School of Chemistry's teaching laboratories are not being used by undergraduate students. These chemistry camps have once again involved visiting students from Jersey

College for Girls and the Maltese School, together with students from individual schools across the south of the UK. This year, we welcomed half of the first-year undergraduate chemists from the European School of Chemistry, Polymers and Materials (ECPM), Université de Strasbourg for their third four-day visit to Bristol ChemLabS. The School is booked again for June 2017.

The regular joint Trinity College, Dublin/University of Bristol summer school did not run this year because of difficulties in Dublin, but is expected to run next year. Although they were not fielding a summer school this year, a representative of the Mukogawa Women's University did visit in August 2016 to set up a proposed visit in March–April 2018. Future chemistry camp bookings are already healthy, including a second school from Malta and a school from Guadeloupe in Easter 2018! No visits this year were planned from Japan or USA as last year a school from Guadeloupe (Caribbean) has already made a booking for Easter 2017.

“The summer school was brilliant! I enjoyed the experiments and practicals, and was impressed how many were fitted into the time. I thought the talks and lectures were very informative and interesting, as well as the tours round the facilities.”

“The summer school was a nice insight into how chemistry might be at Bristol aside from the usual open day spiel. It gave a different perspective, one that was more encouraging of us as prospective chemistry students. It's also a great way to meet like-minded individuals.”

“In terms of the general experience, I thought the summer school was very educational and even entertaining. I was thoroughly amazed by some of the demonstrations during one of the lectures. The lectures from the PhD students were interesting too because it showed what paths I could go on with a Chemistry degree. I learned a lot about practical skills and about some laboratory equipment I've never heard of like the rotary evaporator. It was fun to meet new people from different places as well.”

“I really enjoyed the summer camp! I loved the relaxed working atmosphere and the different experiments and equipment we got to try. Everyone was really welcoming and friendly; a very pleasant experience.”

“I personally, would've loved the camp to last one more day so that we could have, maybe, shadowed the PhD students and really explore the cutting edge research they do. It would have been an amazing experience, and truly inspiring to witness the people making break-through and possibly life-changing discoveries conducting their research. Thank you for the wonderful experience the two-day course has given me, and I hope to see you again as I complete my own degree at Bristol.”

International Visits

Bristol ChemLabS once again worked with Edith Cowan University, Perth, Australia taking part in a variety of outreach activities in November. Outreach talks were given in three schools in Argentina by Professor Neil Allan who was visiting the country as part of a research collaboration.

No visits were, however, made this academic year to South Africa, but one is scheduled for February 2017, to Rhodes for training purposes and a visit to UCT. Bristol ChemLabS did not work with the British Council, (France) this year because of scheduling challenges.

Teacher and Technician Training

UK

Bristol ChemLabS Outreach has continued to play a prominent role in supporting the development of both new and experienced teachers. Bristol ChemLabS Outreach has been actively involved in the Royal Society of Chemistry's Scholars programme for selected PGCE chemistry students with PhDs or top degree passes. Tim Harrison acts as the RSC Scholars Mentor for the South West and a practical session was held in the department in November for six PGCE students, including one of our own former PhDs.

Members of the School of Chemistry have also worked with the Prince's Trust again this year in delivering teacher training sessions for recently qualified teachers at venues in London, Birmingham and Devon. Furthermore, an annual wet chemistry afternoon for a pre-teaching course for 16 held at the University of the West of England was delivered in July. A lecture on climate change Chemistry was given to all 60 of the University of Bristol's PGCE science teachers.

As the PhD thesis of Sarah Glover indicates, there is always an element of in-service training for teachers when we deliver outreach events. We estimate that around 1500–2000 teachers will have received continuing professional development through exposure to Bristol ChemLabS Outreach.

International

Two chemistry teachers from Guadeloupe in the Caribbean came for a week's upskilling in instrumental analysis. The expectation is that they would return for a visit in the following year with their senior school students.

School technician and teacher training in wet chemistry again took place at Edith Cowan University Perth. This annual inset for schools in Western Australia again had two fully attended half-day sessions. A follow-on course has already been scheduled. It is pleasing to note that some schools report that they are using the practical work previously demonstrated in lessons, science clubs and even chemistry lecture demonstration events.

Wider Community Outreach

Bristol ChemLabS Outreach also ran a number of activities for the wider community. Most notable amongst these were the 477 members of the Women's Institute, who participated in Chemistry of a Cream Tea workshops run by Dr Natalie Fey. Over 300 undergraduate students also engaged in various inreach activities.

3. Funding

Research Impact Funding

A number of colleagues within the School of Chemistry have included the costs of impact and public engagement activities, including a proportion of Tim Harrison's time as part of research grant applications. Successful applications cover the full range of the School's areas of research, including Atmospheric Chemistry and Climate Change, Computation Chemistry, Catalysis, Synthetic Biology and Laser Chemistry.

Externally Funded Outreach Projects

NERC Grants in Support of Outreach activities

As usual, Bristol ChemLabS Outreach has greatly benefited from continued inclusion in research grants held by Professor Dudley Shallcross that allow for a range of activity related to climate change and atmospheric chemistry. This includes lecture demonstrations, teacher training and general outreach training.

RSC Small Outreach Grants

Bristol ChemLabS is fortunate to again be in receipt of Royal Society of Chemistry's Small Outreach Grants (£2000 each) to allow for the support of chemistry teaching in geographically remote areas of the Devon and Cornwall: Chemistry Demonstration Lectures for Geographically Remote Schools. An additional RSC Small Outreach Grant to support five days of primary practical workshops will commence in September 2016.

(HEFCE) Project: National Networks for Collaborative Outreach (NNCO)

Bristol ChemLabS Outreach was in receipt of funding from National Networks for Collaborative Outreach, via the University of Bristol's WP Office and the University of Bath.

Funding was given to Bristol ChemLabS Outreach at the School of Chemistry, University of Bristol, to provide outreach activity for students in targeted schools identified by HEFCE. A great deal of the schools that Bristol ChemLabS Outreach had not otherwise engaged with were contacted with a disappointingly small number responding. Activities such as practical workshops at the University of Bristol for senior students or the lecture demonstrations from the *A Pollutant's Tale* suite of talks were made available. In some cases venues were used to which targeted school students were invited. Only one school from the list made contact with Bristol ChemLabS that was not instigated by us, during this period.

Widening Participation Grant (UoB Science Faculty)

Bristol ChemLabS is grateful for the significant support received from the University of Bristol's Widening Participation Grant. The initial grant of £5000 was supplemented by a further allocation of £1000. An additional award of £8200 was made at the end of the financial year. This money allowed Bristol ChemLabS Outreach to support a variety of events including a workshop for local gifted and talented primary pupils based at Redmaids School (Bristol), talks given by postgraduate students in school events, lecture demonstration/science assemblies and some costs associated school-based activities with the BSc UGs Schools Projects placements. Report of activities are given in the Appendices.

Additionally, in July we were delighted to receive additional funding for other outreach projects.

Other Funding

Tim Harrison has continued as the Education Officer of the Royal Society of Chemistry Bristol and District branch, which is very supportive of Bristol ChemLabS Outreach at both the primary and secondary levels.

4. Staffing

Tim Harrison has maintained his remarkable commitment to Bristol ChemLabS in spite of periods of absence due to surgery and medical treatment. Cover has been provided by experienced members of the Bristol ChemLabS Outreach team, including most notably, Dr Stephanie Flynn. We wish Steph well as she moves on to a job in decommissioning nuclear power plants. The significant contribution to outreach made by Dr Stephanie (Steph) Flynn, especially during the periods of TGH absence through surgery and other medical treatment is noted here.

Simone Breckell has settled in quickly to the role of Outreach Administrator and has become an asset to the Bristol ChemLabS Outreach programme. Simone's appointment provides some much-welcomed stability following the departure, at short notice and with no hand-over period, of Hannah Ryan, that necessitated short-term temporary replacement cover. Administrative support had previously been provided by postgraduate students in write-up and pre-employment periods who combined their responsibilities with delivery of outreach activities.

Dr Alison Rivett continues to deliver primary workshops and assemblies within an hour's drive of the University of Bristol, and to deliver training workshops for postgraduate students engaged in Bristol ChemLabS Outreach.

Mrs Pat Cutts continues in her role as outreach technician on an average of one day per week.

5. Student Supervision

Sarah Glover presented her research into chemistry outreach, submitting her PhD thesis which was examined in May 2016. Her thesis, *It's Not Just About the Kids: The Effects of University-Led Outreach on Teachers and the Role of the School Teacher Fellow* has led to several papers; other parts will find themselves into a suitable book/book chapter in due course. The information gleaned from this study of the impacts of outreach outside of the students will lend itself in support of future, bigger outreach grant applications.

6. Future Activities

As ever, many new and repeat activities are already booked for coming years. By mid-September more than 90 secondary events and 20 primary events were scheduled for the 2016–17 academic year with around 10 events for the wider community. This follows the expected pattern; with secondary school teachers planning a year ahead but bookings from primary schools tending to be more last minute.

Appendices

Appendix A. Publications

Published during 2015–16 Academic Year

'Esterification', [Chemistry Review](#) (2016) by Tim Harrison. February 25(3), 6-9.

'Medical or Murderous? Analysing a Victorian Medical Cabinet', [Chemistry Review](#) (2016) by Jenny Slaughter, Tony Rogers, Isobel Wiltshire and Dominic Palubski. February 25(3), 16-17.

[What can be learned from the Bristol ChemLabS centre for excellence in teaching and learning 10 years on?](#) By Harrison T.G., Norman N.C. and Shallcross D.E., (2016). *Education in Chemistry*, Royal Society of Chemistry, Volume 53(2), 26-29.

Marisol Correa Ascencio and Tim Harrison (2016). Archaeological chemistry: analysing ancient alcohol, *Chemistry Review*, 25(4), 2-7.

Huw Power, Tim Harrison and Natalie Fey (2016). [Malaria, Tonic Water and Luminescence](#), *Science for All*, Brazil.

Timothy G. Harrison, Dudley E. Shallcross (2016). [Chemistry Provision for Primary Pupils: The Experiences of 10 Years of Bristol ChemLabS Outreach](#). *Universal Journal of Educational Research*, 4, 1173 - 1179. doi: 10.13189/ujer.2016.040530.

Shallcross D.E., Harrison T.G., Rivett A.C. and Tuah J, [Climate Change: Outreaching to School Students and Teachers](#) (2015) in [Handbook of Climate Change Mitigation and Adaptation](#) Second Edition, edited by Wei-Yin Chen, Toshio Suzuki and Maximilian Lackner, Springer Reference, 1-41. doi:10.1007/978-1-4614-6431-0_53-2

O'Sullivan S.K.E. and Harrison T.G., A Study Into the Design of a Pre-Laboratory Software Resource in Effectively Assisting in the Chemistry Proficiency of Students of Chinese Origin Undertaking Post 16 Chemistry in the UK (2016). *Acta Didactica Napocensia*, Volume 9, Number 1. http://adn.teaching.ro/article_9_1_6.pdf

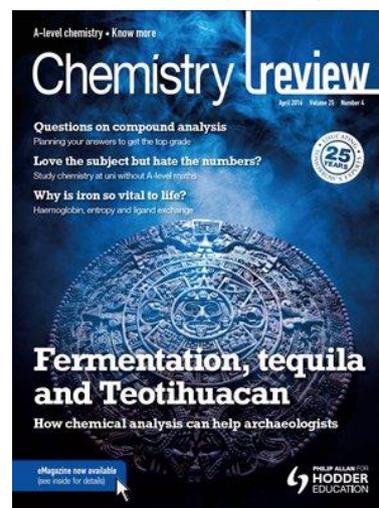
Kiera Watson, Tim Harrison and Natalie Fey (2016). [The Chemistry of the Pineapple](#), *Science for All*, Brazil.

Shallcross D.E., Harrison T.G., Rivett A.C. and Tuah J., (2015). [Climate Change: Outreaching to School Students and Teachers](#) in [Handbook of Climate Change Mitigation and Adaptation](#), edited by Wei-Yin Chen, Toshio Suzuki and Maximilian Lackner, Springer Reference, 1-41. doi:10.1007/978-1-4614-6431-0_53-2

Jenny Slaughter, Tim Harrison and Paul Wyatt (2016). [How Does Post-16 Education Affect Expectations of Higher Education and How Can We Use This Knowledge?](#) *The Practice and Scholarship of Teaching and Learning in Higher Education*, 11(1), 66-88.

O'Sullivan S.K.E. and Harrison T.G., A Study Into the Design of a Pre-Laboratory Software Resource in Effectively Assisting in the Chemistry Proficiency of Students of Chinese Origin Undertaking Post 16 Chemistry in the UK (2016). [Acta Didactica Napocensia, Volume 9, Number 1](#). http://adn.teaching.ro/article_9_1_6.pdf

S.R. Glover, T.G. Harrison, D.E. Shallcross (2016). [Why do Secondary School Chemistry Teachers Engage in Long-Term Outreach Partnership with a University?](#), *Acta Didactica Napocensia*, (9)2, 79-97.



In press

Harrison T.G., Kahn A. Shallcross D.E. (2016), Oceans and Climate Change, Expected: Science in Schools

Saskia O'Sullivan and Tim Harrison (2016). Synthesising aspirin, Expected: Chemistry Review, 26(1), 18-20.

Tim Harrison and Dudley Shallcross (2016). Where do smells go?, Expected: Chemistry Review, 26(1), 10-13.

Tim Harrison (2016). Dealing with significant figures, Expected: Chemistry Review, 26(1), 26-27.

S.R. Glover, T.G. Harrison and D.E. Shallcross, "Secondary Chemistry School Teachers Working In Tertiary Education Chemistry Departments; Critical Reflections on the Positives and Negatives", Acta Didactica Napocensia

Self-healing aircraft wings: a dream or a possibility? by Duncan Wass, Tim Harrison, Science In School 37, 11-13 (2016).

S.R. Glover, T.G. Harrison and D.E. Shallcross, Benefits to secondary school chemistry teachers who have brought their students to engagement activities with a university chemistry department for several years; CPD by diffusion? Expected: HESA

Translations of Previous Outreach Articles Published During the Year

'[Investigating Blood Types](#)' an article by Magda Wajrak and Tim Harrison in Science in School has now been translated Into [German](#) (translator unknown), into [Polish](#) by Magdalena Zel, into [Ukranian](#) (translator unknown) and into [Portuguese](#) by Alexandra Manaia.

[Up, up and away: using aircraft for atmospheric monitoring](#), by Kimberley Leather, Carl Percival, Tim Harrison, Laura Howes, Science in School, translation into [Polish](#) by Marta Tondera and into [French](#) by Caroline Neuberg, Luc and Marie Françoise Choux.

Most Used Outreach Event Types

Spectroscopy Tours

These are tours of the spectroscopic analytical equipment in the School of Chemistry for school pupils in Year 12 or 13, in groups of 8-10 with a postgraduate guide. Each instrument/spectroscopy type (including a selection from Nuclear Magnetic Resonance, Infrared, Mass Spectrometry, Scanning and Transmission Electron Microscopy, Gas Chromatography and possibly X-ray Crystallography) is presented to the students with a short talk by an academic or postgraduate/postdoctoral researcher with a demonstration and possibly hands-on experience. The students see the in action, while learning about how they work and the application of the technique in analytical chemistry.

Residential Chemistry Camps

These are residential chemistry camps lasting between 2 and 5 days, where students have an intensive experience of university chemistry, spending each day in a combination of laboratory work, lectures and possibly spectroscopy tours. They take place in January, March/April and June/July.

The Trinity College Summer School involves time at the University of Bristol and also Trinity College, Dublin over a period of 5 days. Demonstration Lecture The demonstration lecture is 'A Pollutant's Tale', 'Gases in the Air', or 'A Chemical Delight', or a guest lecture which involves practical chemistry demonstrations. 'A Pollutant's Tale' is the more advanced older brother of 'Gases in the Air'. It involves many of the same practical demonstrations as 'Gases in the Air' but with a focus on Climate Change. 'A Chemical Delight' is a chemical kinetics demonstration lecture.

Postgraduate lectures

These are short lectures given by current postgraduate students (and sometimes postdoctoral students), on a topic related to their research. These lectures have no demonstration or practical component and usually take place along with one of the demonstration lectures in the afternoon after a morning spent in the laboratories.

Evening lectures/Schools' conferences

Schools' Conferences and lectures take place a few times a year, and involve talks by scientists from the University of Bristol (as well as other institutions) on their research, aimed particularly at secondary school students. They take place in the early evening or late afternoon. There may also be demonstration lectures by the STF along with visiting academics. They may be sponsored by learned societies or the University of Bristol alumni. Research Activities and Special Events These activity types refer to non-routine activities taking place at the university. This would be any practical activity or lecture event which is not run by Bristol ChemLabS as part of their usual offerings for schools, but is led by a research group or academic working with a school as part of a special project or grant, as has happened through Royal Society Partnership grants for example, which allowed for research partnerships between academics and schools.

Practical Competitions

These include Top of the Bench (Royal Society of Chemistry sponsored), the Royal Society of Chemistry Analytical Competition and Salters' Competitions sponsored by Salters.

Schools Lecture Demonstrations

These are the same demonstrations as would take place at BCL, but taking place at the school, often involving the whole school in an assembly-type context.

Practical Workshops

Practical Workshops taking place in a school for secondary school students are unusual, but occasionally fragrance/perfume chemistry workshops or the primary circus of practical experiments might be done in a secondary school with secondary school pupils. However, secondary schools often arrange these events for their primary feeder schools. This involves engagement with a secondary teacher as they organise the event, but in practice involves working with primary school children and their teachers on the day of the event. Included in this category is any specially arranged event taking place at a secondary school and arranged by a secondary school teacher that involves hands-on practical work with either primary or secondary pupils.

Spectroscopy in a Suitcase

Spectroscopy in a Suitcase involves a mobile kit of Infrared and UV-vis spectroscopy instrumentation and activities delivered by postgraduate students for senior students at their own school. The visits are free due to sponsorship by the Royal Society of Chemistry.

Special Events

This category involves any special event arranged by the secondary teacher, taking place at the school and involving lectures/demonstrations rather than practical activities. Unlike the 'Lecture demonstration' category this would involve other invited schools and attendees not just a demonstration assembly for the school.