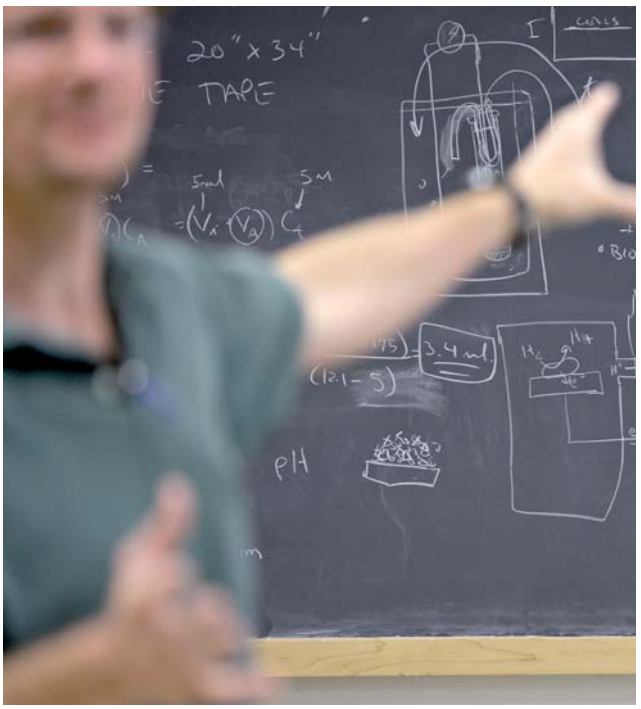
Research Councils UK

Engaging Young People with Cutting Edge Research:

a guide for researchers and teachers

RESEARCH COUNCILS UK



Research Councils UK (RCUK) support a portfolio of successful and innovative initiatives that connect our researchers to schools, as well as providing high-quality and engaging resources for every subject discipline. This helps to inspire the next generation of researchers whilst supporting teachers in the classroom and supporting researchers to develop their public engagement talents.

Securing and sustaining a supply of researchers is vital to ensure that the UK maintains its current world-leading position, providing critical contributions to the economy and the pressing challenges facing society.

About this publication

This publication is divided into three sections; the researcher section on pages 1-8 and the teacher section on pages 9-14 offer some helpful signposts, to both teachers and researchers, on how to get started working together. The resources section on pages 15-20 highlight the variety of activities available to researchers and teachers.

RESEARCH COUNCILS UK

Information for Researchers

RCUK are committed to supporting researchers working with schools, as we believe that engaging young people with research can provide substantial benefits and should be a part of every skilled researcher's portfolio. The experience of working with schools and young people can provide a unique opportunity for a researcher to develop their skills and improve their research by widening their research horizons. To add to the feel-good factor researchers can have a hand in inspiring the next generation of researchers, to secure and sustain the research base and the UK economy. Researchers are also able to offer an in-depth knowledge and enthusiasm for their research area which can bring a subject to life and highlight its relevance to the world we live in and to enable more young people to act as informed citizens.

The following researcher section includes further information and frequently asked questions from researchers on what to expect, before pointing you in the direction of schemes, activities and resources to get you started.

www.rcuk.ac.uk/per/researchers

Working with schools and young people – how can it benefit me as a researcher?

Working with schools, as well as being enjoyable, can provide researchers with opportunities for their own continued professional development in line with the Research Councils' Joint skills statement and the Researcher Development Framework. Please visit **www.rcuk.ac.uk/rescareer/rcdu/training** and **http://vitae.ac.uk/policy-practice/161261/researcher-development-framework.html** for more information.

The table below highlights examples of the important skills and attributes which researchers can develop through working with schools and young people.

Skills and attributes				
Confidence and self development	**Communication**	**Understanding the views of others and the impact of your research**	**Management and team work**	**Creativity**
➜ Self-esteem and maturity	➜ Written and oral communication skills	➜ Recognising different people and different viewpoints	➜ Project management	➜ Understanding different learning styles
➜ Self awareness, patience, and empathy	➜ Public relations skills, design and marketing experience	➜ Interpersonal skills	➜ Working with others	➜ Seeing different parts of the bigger picture
➜ Negotiation skills	➜ Feedback and listening skills	➜ Reflective ability	➜ Problem solving and forward planning	➜ Thinking on your feet
➜ Facilitation skills	➜ Presentation skills	➜ Diplomacy and listening skills	➜ Budgeting, planning and evaluation experience	➜ Thinking laterally
➜ Risk management	➜ Designing and maintaining a dialogue	➜ Developing perspective, developing approaches to research	➜ Fundraising and event management experience	➜ Able to work in new environments
			➜ Supervising, mentoring, coaching and teaching skills	

Young people and schools – what are the benefits?

As a researcher you are in a unique position to engage young people with a world they may not otherwise encounter or consider, which can often have far reaching impacts. Bringing the curriculum to life by linking it to real life research is an exciting experience which can also help to encourage and stimulate the next generation of researchers. Schools and research establishments often make their first valuable links with one another through individual contacts made on, for example, a researcher placement. These can be the beginnings of establishing steady partnerships in the longer term, bringing value to whole local communities.

Researchers working with schools – some frequently asked questions

Is working with schools difficult?

Working with schools can be hugely rewarding and is most successful with forward planning. Some thought about appropriate subject matter and involving teachers and young people at an early stage is recommended. This could be done by looking at teacher lesson plans or finding out what the curriculum looks like for different key stages. Also identify the level of commitment that you can make to the school from the outset.

What types of work with schools could I do?

A range of exciting opportunities exist for working with schools. They can involve different levels of commitment from one-off visits to longer-term placements at the school. There may also be opportunities for the schools to visit your research institution. Examples include:

- applying your own research to enhance the school curriculum and pupils learning experience
- helping with practical projects and experiments or performing demonstrations
- working with after school clubs or national schools competitions
- making school visits to talk to students about your work or share your experience
- a variety of mentoring relationships with students
- inviting students into your university/research institution for a tour or placement
- working with teachers to help develop their knowledge of contemporary research and improve their continued professional development
- getting involved with development of resources to be used in schools, for example, developing websites
- getting involved with schools careers events

CASE STUDY

Name: Cerys Ponting
Research Area: Business Relationships, Accountability, Sustainability and Society
Cardiff University

"I developed better communication skills and gained a heightened awareness of how eco-schools incorporate sustainability; which is useful, not only for me and my research, but also for the centre I work in, BRASS. Such work can help my colleagues in developing better, more useful tool kits that would be suitable for schools and students to use, for example. It would better inform them on what kind of information would be useful, and what wouldn't, to make research accessible to a younger audience."

CASE STUDY

Name: Alana James
Research Area: Psychology Unit for School and Family Studies, Goldsmiths, University of London

"During my placement I gave two presentations about my research and psychology as a career, helped out during regular classes and was even asked to participate in a staff/pupil meeting on anti-bullying. This was particularly interesting for me, as my PhD research is on anti-bullying methods in schools.

The placement was fun and I gained experience of talking about my research in a more accessible way than I would usually. It also allowed me to practice and work on my interpersonal and general people skills. Being asked new questions was exciting; the students asked very different questions from those I would normally be asked by other academics."

A survey of over 1,000 scientists carried out in 2004 for the Royal Society showed that just over half (52%) had been influenced in their choice of career by a visit to a scientist's or engineer's place of work, and nearly a quarter (23%) had been influenced by a scientist or engineer visiting their school

Taking a Leading Role 2004 survey

Are there subject areas, that will be more suitable than others?

Whether your area is social, physical or life sciences or within the arts and humanities, there are opportunities for enthusiastic researchers from every discipline to work with schools. There is also a policy driver as A-level entries in the physical sciences and mathematics in particular have seen significant declines during the last decade, and although these trends are now beginning to change in some STEM (Science, Technology, Engineering and Maths) subjects, government is keen to support learning in these areas.

What activity?

When planning your activity make early contact with the school to discuss expectations and share ideas. Some areas to consider are:

- how involved or hands-on your audience will be; it's often a case of more is best
- how you are going to get all of your audience hooked; even those that may not have much interest in the subject matter
- how broad or detailed you will need to keep the activity to suit everyone's learning age and the needs of the teacher
- how you will link activities and materials to the real world and your audiences experiences
- how you might build interest before the activity and maintain interest afterwards

Just as interesting will be sharing what you know about what it's like to be a researcher, or what is involved in the thinking around any research question. Approaches to secondary teaching such as 'How Science Works' at GCSE include a focus on explanations, arguments and decision making skills as well as practical and enquiry skills and provide a wonderful opportunity to help pupils become critical, creative thinkers and flexible problem-solvers.

Which age group?

RCUK's strategic focus is on engaging secondary school pupils with research, although some of our resources are also aimed at primary school pupils. We want to engage young people with research, not just to support those who might be considering research careers, but to enhance all young people's learning experiences with the vitality that research and researchers can bring to a subject. We also want to raise awareness of the career opportunities available to young people through research. We know that most young people start making choices about their future career options from age 12 onwards, and many decisions are often formed by age 14[1]. This is why we believe it's important to reach secondary school pupils of all ages, not just the post-16 age group.

[1] How do young people make choices? – NFER study

CASE STUDY

Name: William Grey
Research Area: Geography
Placement: Swansea College

"My aim was to teach a class of second year A-Level (A2) students at Swansea College about the issues surrounding the science of climate change. Climate change is the largest contemporary issue that humanity faces and I hope my time with the students will inspire them to achieve in whatever field of endeavour that they choose to pursue.

I developed a set of lessons that were based around research talks and practical investigation. The students gained first hand experience of examining long term temperature records, experimenting with climate models and exploring future carbon emission scenarios. In addition each student put together an academic style poster on an aspect of the climate that particularly interested them.

As well as the direct benefit to students, my time at Swansea College has also allowed me to examine the bigger picture and explore areas of climate science that I would not otherwise have had the opportunity to do."

When asked which groups were easiest to talk to about research findings, of 1500 research scientists almost half (45%) mentioned schools

2006 Survey of factors affecting science communication by scientists and engineers

Researchers working with schools – some frequently asked questions

Will I need training to work with schools?

Training and background reading can help to increase your confidence and the value of your activity by helping you understand what a school, teacher, or class might need. The experience of working with schools should be seen as a development opportunity in itself, but some researchers may wish to practice their communication skills or learn some techniques for relating to young people in particular. There are many formal training opportunities for researchers wishing to work with schools, many of which are free for RCUK funded researchers.

For a range of training opportunities for public engagement, including working with schools, available to researchers, please see National Coordinating Centre for Beacons for Public Engagement (NCCPE) training opportunities list (**www.publicengagement.ac.uk/our-projects/training-opportunities**). If you are a member of a learned society or professional body it is also worth consulting them about whether they have some ready-made resources for your discipline.

What about Criminal Record Bureau checks?

There may be a requirement for Criminal Record Bureau (CRB) checks. However the schemes provided by RCUK can offer help and support. STEM ambassadors will also be able to arrange a CRB check for you.

The experience of working with schools should be seen as a development opportunity in itself

CASE STUDY

Name: Tamsin Langley
Institute of Psychiatry, Kings College London
Placement: Phoenix High School, London

"My Researchers in Residence placement was at Phoenix High School. My passion is neuroscience and so I focused on how amazing the brain is through mini-practicals involving balancing rulers, eating sweets blindfolded whilst holding your nose and fooling your brain into perceiving the colours of words rather than the words themselves. The 15 and 16 year olds I worked with were fascinated by facts such as the adult brain is a mere 3 pounds, yet it uses up to 25% of our oxygen intake and has messages flying around inside it at an incredible 268 mph! They also enjoyed the true story of Phineas Gage, an unfortunate railway worker, whose personality was altered due to a pole piercing his left frontal lobe! This sparked off much debate over nature versus nurture with regard to criminal behaviour. With this year 11 class I also talked about how much fun a PhD is and how science can take you anywhere in the world to study anything you want to.

By the end of my time with them I believe they had a better idea about how exciting science is in the real world. I also worked with a class of Year 9's (13-14 year olds) during my placement leading a discussion on Animal Research and incorporated real life accounts of people whose lives have been dramatically improved through this work.

Because of the fantastic time I had with the students I am seriously considering becoming a school science teacher!"

What are teachers likely to expect?

Teachers will be pleased to work with you, but remember that they often have severe time constraints. By necessity their priorities will always be linked to what will help them and their students reach learning targets. The teacher will be in charge of the classroom, and you will be their visiting expert so there is no need to worry about management of the class. A range of advice and information exists[2] about the sort of things to expect when going into a school but often the best way to find out about what a school teacher might want from your involvement is to find one and ask! Make sure you contact teachers you are likely to be working with before undertaking a lot of planning, it will probably be useful to work in partnership with teachers to develop your whole activity.

[2] See http://www.publicengagement.ac.uk/our-projects/working-with-young-people

CASE STUDY

Name: Dr Claire E. Cockcroft
The Babraham Institute
Research Area: Contemporary issues in biomedical science: animals in research

"This project brings science and industry closer to young people to raise aspirations about future careers and increase the attractiveness of science-based vocations.

A half-day workshop at the Babraham Institute for year 10 (14-15 year-olds) students aims to stimulate discussion around the ethical issues confronting scientists doing biomedical research and to encourage students to think about the wider social/ethical implications of scientific discoveries they hear about in the media."

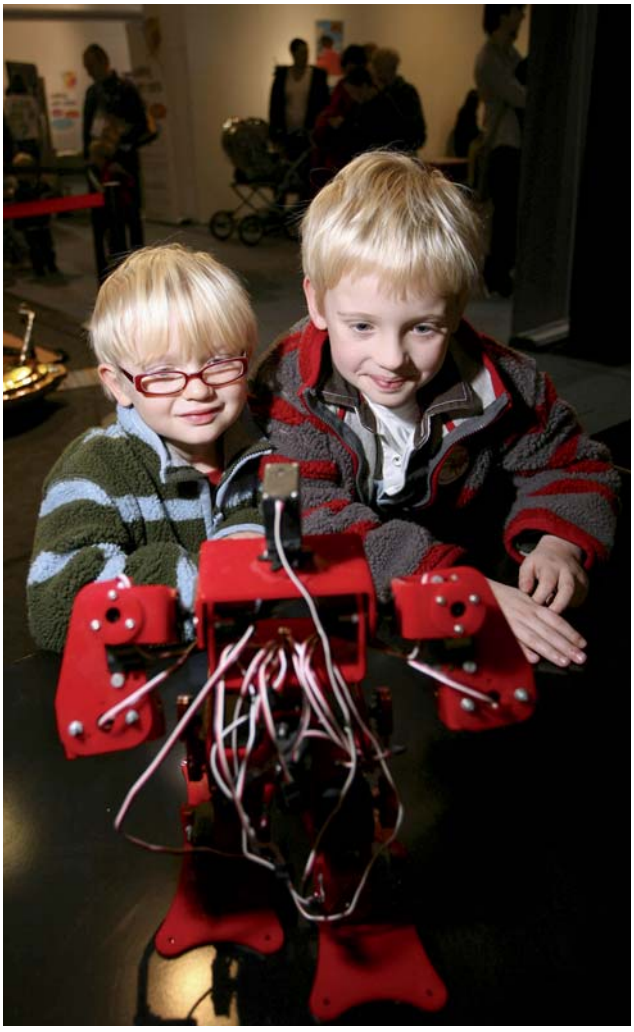
If I work with schools, will my achievements and skills development be recognised?

RCUK has co-funded a national scheme called Beacons for Public Engagement to establish a coordinated approach to recognising, rewarding and building capacity for public engagement. For example, some universities now recognise public engagement within their promotion criteria. More information about the work of the Beacons is available at the National Coordinating Centre for Public Engagement (NCCPE) website: **www.publicengagement.ac.uk/our-research**

RCUK is committed to looking at how working with schools in particular can become more widely recognised as a valued activity, please **visit: www.rcuk.ac.uk/per** for more details.

Information provided through these links may be useful to you in making a case for working with schools and having your achievements recognised.

RCUK is committed to looking at how working with schools in particular can become more widely recognised as a valued activity



Walking with Robots, UWE, Bristol

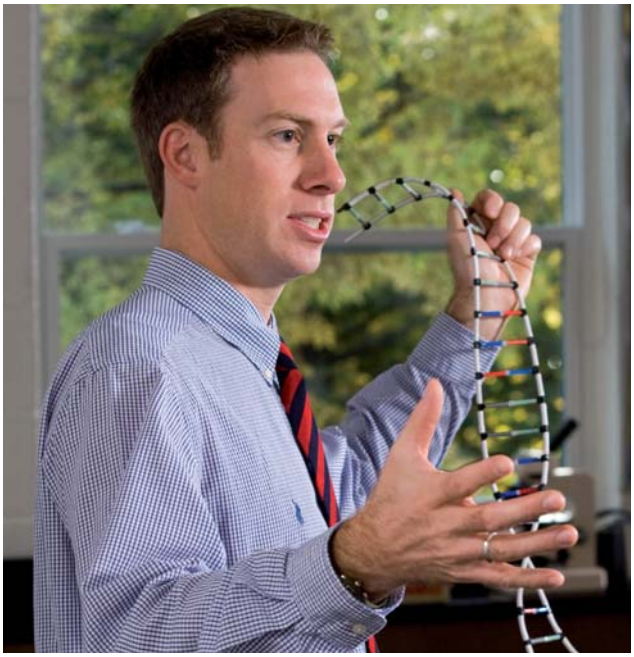
Researchers working with schools – some frequently asked questions

How can I get started?

RCUK provides a number of free schemes and resources listed on pages 17-18 which will help you work with schools in a range of different ways, depending on your interests, time available, career stage, and area of research.

The NCCPE also offers a range of funding opportunities and support for public engagement, including working with schools. Page 19 offers useful links to other resources and guidance including the NCCPE website.

In addition, a good route is to speak to your university or learned society who may already have links to schools. Or you could contact your local school directly. It is usually best to start with a Headteacher or Head of Department, however, you may sometimes need to persevere to make initial contact with these very busy people.



RCUK provides a number of free schemes and resources which will help you work with schools in a range of different ways, depending on your interests, time available, career stage, and area of research

CASE STUDY

Name: Siân Prosser
Research Area: Department of French, University of Sheffield
Placement: Dover Grammar School for Girls

"I developed an interdisciplinary project involving the French, English and History departments of Dover Grammar School for Girls. The central idea for my residency was to build on the curriculum teaching of the Norman Conquest by working with the school students on a Newspaper for the Middle Ages project. 20 pupils from all years worked together to become chroniclers of the events of 1066 and produce the newspaper.

Over the course of six visits, I developed a series of activities to help with the production of the newspaper, which included:

- a jigsaw puzzle on the Bayeux Tapestry
- role plays with the chroniclers interviewing historical figures
- research using the Bayeux Tapestry, excerpts from contemporary chronicles and the Doomsday book

The chroniclers set to work producing The Chronicle, a brilliant newspaper containing news articles, interviews, commentaries, illustrations, Anglo-Saxon charms and riddles, obituaries and adverts. The finished product can be viewed at: www.dggs.t83.net (click on curriculum, then history and The Chronicle button).

The end product was excellent and did justice to the pupils enthusiasm and creativity. Whilst some of the sources and documents we used were quite challenging the students dealt with them really well."

"I tried to transmit the joy of being curious and learning new things. By doing so I discovered it a bit more myself. I strongly encourage all researchers out there to take the plunge; I know it's hard to fit one more commitment into our crammed schedules, but the rewards are priceless."

Davide Rizzo, Astronomer, Physics, Imperial College London working with City and Islington Sixth Form College

"I was worried that I would be dumped in front of a mob of 100 bored teenagers but I pretty soon worked out that my idea of secondary school life was somewhat off-kilter. In fact both teachers and pupils were enormously welcoming from start to finish, making this one of the most rewarding teaching experiences I've had."

Sarah Jackson, Centre for Continuing Education, University of Sussex working with Uplands Community College

"I worked with GCSE students, who were thinking about doing A-Levels at that time. It was really nice to hear from the school, thanking me for these talks as the numbers of students choosing A-Level sciences has increased from last year, so they told me my talk must have helped!"

Stuart Kyle, Biochemistry & Molecular Biology, University of Leeds working with Ryburn Valley High School

"I was able to discuss my PhD work with a non-specialist audience which turned out to be really refreshing."

Chloe Jenner, Chemistry, Imperial College London working with Eaton Bank School, Manchester

"I have found this experience to be a highlight of my time as a research student. I enjoyed the interaction with young, inquisitive minds and hope that they learned from me what research can lead to."

Claire Chambers, Geography, Queen's University Belfast working with Glenlola Collegiate School

"It was really rewarding to hold an audience for a lecture and to know that they had paid attention purely by the inquisitive questions they were asking at the end. I really enjoyed the experience and would recommend it to anyone in research as a great way of building confidence and translating your work to a wider audience."

Andrew Pinder, Department of Cardiology, Wales Heart Research Institute working with Richard Huish College

Information for Teachers

RCUK aims to help schools and researchers work together to enhance the experience of contemporary research for young people and teachers. Researchers make excellent role models for young people and can play a key role in motivating students, raising ambition and bringing subjects to life with their expert knowledge and enthusiasm for a topic. Teachers can also benefit from extra classroom support particularly in delivering and enriching the more challenging areas of the school curriculum, as well as access to innovative Teacher CPD and resources.

The following teacher section includes further information and frequently asked questions about working with researchers and highlights the wealth of free high quality schemes, activities and resources available to you.

www.rcuk.ac.uk/per/schoolsandyoungpeople

Working with researchers
– what's in it for me and my school?

Having a researcher placement, working with researchers on projects or to develop resources can:

- enhance teaching, learning and pupil motivation; especially in difficult or teacher non-specialist subjects
- ensure that pupils have experience of a variety of role models; from a variety of different backgrounds
- result in innovative CPD[3], often with great new ideas and materials for running experiments, projects or topics for classroom debate
- develop and provide additional resources for projects
- make valuable connections for the school with local universities
- introduce multi- and cross-disciplinarity to the classroom, for example, why not look at a mathematical problem through the eyes of a social scientist?
- enhance the reputation of your school
- help secure small funding bids to enhance science and encourage scientific research by your students

Working with researchers can also help the school engage with the local community, which can be valuable in itself and a helpful part of the evidence that goes into, for example, school self evaluation forms.

Additionally, working with researchers will help you to ensure that the school is supporting Government initiatives such as Every Child Matters. Researcher visits can help you ensure that aspects of economic wellbeing, curriculum enrichment, raising aspirations, motivation and widening participation are addressed.

A common theme amongst 86 schools[4] particularly successful at encouraging students to study science post-16, was that they enriched the curriculum by visits, visitors and projects that bring the world of research into the classroom.

[3] In a recent Astrophysics CPD course run through the Teacher CPD Bringing Cutting Edge Science into the Classroom Scheme, post-course impact assessment showed that 91% of participants commented on using the practicals in their schemes of learning and these enlivening lessons; 80% mentioned use of the course to develop clubs/after school activities/community events; Following the course, three schools taking part are now planning to offer GCSE Astronomy.

[4] Secondary national strategies 2009 – report

There are a range of schemes and events that provide great opportunities for schools and research communities to get in touch with one another

Schools working with researchers – some frequently asked questions

What type of work with a researcher could I do?

There are a range of exciting opportunities available for schools wanting to work with researchers to enhance the curriculum and support teachers. There are also a variety of mechanisms to engage with researchers, which vary in the length and type of contact such as placements, joint projects and developing resources. Examples, of the types of activities where you could work with and involve researchers include:

- applying research to enhance the school curriculum and pupils learning experience
- developing your knowledge of contemporary research
- improving your continued professional development
- assisting with practical projects, experiments and practical demonstrations
- involving a researcher in school clubs or national school competitions
- inviting a researcher to school career events
- researchers acting as mentors and role models for students
- researchers developing resources for the classroom
- facilitating a university/research institution tour or placement

How do I know whether working with a researcher will meet the needs I have for my classroom?

It is always advisable to have a conversation with the researcher early on to make sure that everyone's expectations are clear from the beginning.

Why would a researcher want to work with our school?

Working with schools can be an important part of a researcher's learning and development, helping researchers to develop skills such as communication, creativity and team work. Enabling more young people to act as informed citizens, and inspiring the next generation of researchers, is hugely enjoyable and rewarding for a researcher passionate about their research. Working with schools can also provide a researcher with a broader perspective to enhance their research.

CASE STUDY

Name: Ellen Travers
Role: Faculty Team Leader of Science
School: The Ridgeway School, Wroughton

"We are a Science Specialist Status School always looking for ways to enhance our curriculum, engagement with the community and send budding scientists out into the world.

Tom, an Organometallic Chemist, has had a hugely successful Researchers in Residence placement with us. He has worked across the age and ability range delivering exciting sessions on food in Chemistry week to four different classes and he joined our STEMNET after school club Extreme SEARS to help them with their investigations into food science. The sixth form session on catalysts was greeted with varying comments from "I never realised how amazing an enzyme could be" to "I never want to study Chemistry at Uni"; well you can't win 'em all!"

We are a proactive department fortunate to have a team who love science and want young people to be inspired too. With restraints on trips due to cost of cover and the huge commitment to modular exams, having Researchers in Residence come in to us is an ideal way to enrich both the curriculum and out of school activities. So far students in years 7, 8, 10 and 12 have benefitted from the experience. Teachers get other ideas for bringing science to life, and Tom for one has been a great ambassador for a career in research.

Obviously this is a time commitment but we feel that staff and students and hopefully the researcher have benefitted and we will continue with it in the future. Such is the positive impact that we are trying to roll out the use of RCUK's Researchers in Residence scheme to other departments in the school so that not only science but also the arts benefit. We would certainly recommend that other schools seize the opportunity and make the most of this invaluable free resource!"

Is it time consuming?

Anecdotal evidence from teachers and researchers suggests that the positive impacts, including on the engagement and learning of pupils, balances the time commitment needed from both the school and the researcher. The researcher is likely to be sympathetic to the time restraints on the teacher and should be viewed as a valuable additional resource to the school.

Is it difficult?

As the teacher you will still be in charge of the classroom and your pupils learning, but will have the opportunity to work with an enthusiastic researcher who has put themselves forward to work with you. You should work in partnership with the researcher to discuss and plan activities and ensure maximum benefit.

Can any subject area benefit from working with a researcher?

There are opportunities for schools to work with researchers across the full spectrum of academic disciplines to help make the subject matter more interesting and fun. Researchers can support those delivering science, technology, engineering and maths as well as the social sciences, arts and humanities in schools.

Is it only suitable for secondary schools?

RCUK provides resources for primary and secondary school education. The majority of RCUK schemes are aimed at secondary school level to enhance the more challenging areas of the school curriculum and provide role models for young people.

Making contact initially – how do I get in touch with a researcher?

There are a range of schemes and events that provide great opportunities for schools and research communities to get in touch with one another, some examples are listed on pages 17 and 18. Some schemes will provide advice to both researchers and teachers about how to find their ideal placement and will offer training to the researcher prior to the placement start, for example, RCUK's Researchers in Residence scheme. Teachers can also think about getting in touch with a local university outreach department for advice about researchers available to work with your school.

Where can I find funding?

The resources offered by Research Councils UK are free. There is also additional funding available such as the bursaries offered for Bringing Cutting Edge Science into the Classroom to cover costs such as supply teacher cover.

How can I get started?

Included in this booklet are some case studies to help inspire you. When you are ready, the resources on pages 16-20 will help to get you started.

CASE STUDY

Name: Cerys Ponting
Research Area: Business Relationships, Accountability, Sustainability and Society
Cardiff University

"I set up an after-school eco-club which helped the school to achieve its first green flag.

During the eco-club, students had to conduct surveys of the school grounds, collect information on waste, energy and water use. Students used digital cameras around the school grounds to assess and document their surrounding environment. One session focused on examining the contents of the school's waste bins, looking at what gets recycled and what doesn't. The session was photographed, allowing students to document what they found and present the findings back to the rest of the school in an assembly."

CASE STUDY

Name: Alexander Lawson
Role: Biosciences, University of Birmingham

"I met with my placement teacher and discussed what we wanted out of the placement. We agreed I would teach part of the sixth form biology course as well as highlighting some of my own work and possible career choices in science. My placement was spread over a week and the best thing was seeing the students becoming interested in science. It was heartening to see them enthused about basic concepts and have them respond to my questions with earnest, well-thought-out answers."

CASE STUDY

Name: Hilary Bishop
Research Area: Archaeological Heritage Management,
Institute of Irish Studies, University of Liverpool

"When matched with one school, I found that another researcher was also working with the school on a geological project. The other researcher planned to work with students examining geology thousands of years ago. After talking, we came up with the idea of doing a joint project examining the effects of climate change on the planet, from the dawn of time versus present day, using archaeological techniques and evidence to draw conclusions. The project linked in well with the curriculum, as climate change was a topic students were already learning about in class. We did several presentations, organised a fossil quiz and even set up a timeline in the playground that students could get involved with; physically charting changes to the planet over the ages."

"All was fantastic! The video conference was very exciting as it brought me up to date with new genetics. Activity ideas would be easy to implement in the classroom. Brine shrimp!! Can't wait to get some."

Teacher participant in CPD (Genetics) – Bringing Cutting Edge Science into the Classroom

"I enjoyed the hands on practical that I was introduced to which I will definitely use when teaching this topic."

"I enjoyed all of it. Both talks filled in background areas and gave me details I didn't previously have. The practical aspects gave ideas for simple but effective class experiments."

Teacher participants in CPD (Nanotechnology) – Bringing Cutting Edge Science into the Classroom, Ryburn Valley High School

"The Astrophysics course was brilliant; especially the mix of theory followed by hands-on activities, bringing the new science into the classroom."

Teacher participant in CPD (Astrophysics) – Bringing Cutting Edge Science into the Classroom

"The project was a fantastic experience for the students. It helped them analyse situations and pick up different techniques. All children at different abilities were interacting; you could see the potential benefits for their development. You only have to look at the researchers in action to see their enthusiasm and how powerful the different techniques they use are for doing something special with the students. Bringing real-life researchers into the school is a powerful learning tool. The students were treated as adults and expected to come up with their own ideas. You could see the project open up their eyes and suddenly they saw the world was a bigger place. Students can be very tunnel-visioned without experiencing other things."

Dr Moira Martin, Chemistry teacher and head of careers, at Sherfield School Hampshire

"The teachers' feedback clearly shows that the event was a great success. Evaluating the summer school, all twenty gave it a top very good rating. Comments, referring again to the whole summer school, included, "Lots of good ideas to take back to school", "It was a delight to meet with other physics teachers and be able to discuss real physics teaching" and "The best CPD experience I have ever had."

Speech, Language and Communication Needs (SLCN) regional coordinator, Bringing Cutting Edge Science into the Classroom – Motion Capture and Analysis (Sports Science)

Resources for Researchers and Teachers

Three Top Tips
for researchers and teachers working together

1 Manage
expectations

Be clear about what you want and how what you are doing will achieve this; make sure all parties and (if relevant) supervisors and Headteachers understand and agree what's being done.

2 Plan
ahead and communicate

Meet with each other beforehand to discuss your ideas, ascertain needs and constraints, identify timelines and resources required, find out how other people have run successful activities; researchers should think about any training or checks needed beforehand and think about any risk assessments required.

3 Evaluate
and get feedback

If you do this you will know and be able to share with others what you have learnt and what you achieved through the experience. It's often a good idea for the researcher to arrange a debrief session with the school or create a short pupil questionnaire.

RCUK Schemes, Activities and Resources

The Research Councils UK fund a range of schemes, activities and resources that help link researchers and young people. Further information is available at **www.rcuk.ac.uk/per/schoolsandyoungpeople**

Researchers in Residence (RinR) Scheme – age group: 11-19

Positive role-models who can bring the excitement of modern research into the secondary classroom. RinR provide schools with access to RCUK and Wellcome Trust funded researchers, from all curriculum areas. The researcher can spend up to a week in residence, working in partnership with teachers. All RinRs are trained in how to communicate their research to non-specialists, and undergo a Criminal Records Bureau check.

www.researchersinresidence.ac.uk

Bringing Cutting Edge Science into the Classroom – Teacher CPD

The Bringing Cutting Edge Science into the Classroom Teacher CPD Programme is designed to help secondary school teachers deliver some of the more challenging aspects of the curriculum in a way that captures and retains the interests of learners. It is also designed to support teachers' development of specialist knowledge and to facilitate links between teachers and contemporary research. The courses have been developed by the Science Learning Centre Network in conjunction with leading RCUK researchers and are linked clearly to the science curriculum. As well as exploring contemporary research, courses address the social and ethical issues behind the research and the relevance of maths skills.

www.slcs.ac.uk/cuttingedge

CREST Awards – age group: 11-19

CREST (Creativity in Science and Technology) is the only nationally recognised accreditation scheme for project work in the fields of science, engineering and technology. The scheme is highly regarded by educationalists, industry and organisations involved in Science, Technology, Engineering and Maths (STEM) enrichment and engagement. CREST enables students of all abilities to explore real scientific, engineering and technological problems for themselves through mini research projects, and promotes work-related learning.

CREST awards aim to motivate students, build confidence and encourage them to pursue careers in science, engineering and technology. The students are encouraged to develop their scientific curiosity, problem-solving and communication skills. Currently CREST reaches some 22,000 young people per year. The awards are facilitated through a mentoring system creating links between schools and industry or higher education.

www.britishscienceassociation.org/web/ccaf/crest

Nuffield Bursaries – age group: 17-18

The bursaries are designed to give first year post 16 science students a worthwhile summer experience, and the opportunity to be among the next generation of science, technology, engineering and mathematics professionals. The scheme gives students the chance to work in leading scientific industries, research institutes and UK universities during their summer holidays.

www.nuffieldfoundation.org/go/grants/nsb/page_390.html

Schoolscience.co.uk – age group: 5-19

Teachers and students can find all Research Council e-resources relating to science education on this website. Teachers and students can find our resources by following the partners link on the site which will take them to the RCUK link. From here you can access a list of each Research Council's e-resources. The material is designed to enrich the teaching and learning of curricular and non-curricular science, helping both teachers and students see how what is learnt in the classroom relates to the real world.

www.schoolscience.co.uk

Local Coordinators – age group: 5-19

Several Research Councils operate schemes which provide local coordinators who link schools with researchers from Research Institutes across the UK.

www.rcuk.ac.uk/per/localcoo

Schemes, Activities and Resources from individual Research Councils

The RCUK Resources for Schools brochure is available at **www.rcuk.ac.uk/per/schoolsandyoungpeople** and details the schemes, activities and resources available from each Research Council, covering research across all the subject disciplines.

Economic and Social Research Council Festival of Social Science: **www.esrcfestival.ac.uk**

Engineering and Physical Sciences Research Council: **www.noisemakers.org.uk**

Social Science for Schools: **www.socialscienceforschools.org.uk**

Other useful resources and guidance

Researchers

RCUK Beacons for Public Engagement: **www.publicengagement.ac.uk**

Dialogue with the public – Research Councils UK Resources:
www.rcuk.ac.uk/per/pubdia.htm

Evaluation: **www.rcuk.ac.uk/aboutrcuk/publications/corporate/evaluationguide.htm**

NFER/NESTA publication:
www.pre-online.co.uk/REpdfs/3_nesta.pdf

For an overview of education systems visit:

England, Wales and Northern Ireland:
http://eacea.ec.europa.eu/education/eurydice/eurybase_en
and choose United Kingdom (England, Northern Ireland, Wales)

Scotland:
http://eacea.ec.europa.eu/education/eurydice/eurybase_en
and choose United Kingdom (Scotland)

QCDA's National Curriculum website – **http://curriculum.qcda.gov.uk/index.aspx** – includes curriculum purpose, aims, key stages, attainment levels, target setting, what's changed/changing and programmes of study. Teachers deliver the curriculum through schemes of work, and most schools' approach to curriculum delivery is individually defined through choice of schemes of work for a given subject. A range of schemes are available to teachers for example see QCA/DCSF schemes of work website **www.standards.dfes.gov.uk/schemes3**

Teachers

Department of Children, Schools and Families (DCSF) STEM directories comprise a collection of schemes and activities provided by organisations from across the UK to enhance and enrich the school curriculum: **www.stemdirectories.org.uk**

General Teaching Council (GTC) guidance – teachers working with support staff in school: **www.gtce.org.uk/documents/publicationpdfs/policy_1203_hlta.pdf**

National Strategies advice to teachers for effective collaboration (in science education, but useful tips for other subjects too): **http://nationalstrategies.standards.dcsf.gov.uk/node/97609?uc=force_uj**

National Foundation for Educational Research (NFER) Planning a research project: **www.pre-online.co.uk/REpdfs/7_03rickinson.pdf**

Careers awareness website for teachers: **www.futuremorph.org**

After School Science and Engineering Clubs (ASSEC's): **www.stemclubs.net**

National Science and Engineering Week: **www.britishscienceassociation.org/web/nsew**

STEMNET: **www.stemnet.org.uk/ambassadors.cfm**

Teacher Scientist Network: **www.tsn.org.uk**

RCUK is the strategic partnership between the seven UK Research Councils. Each year the Research Councils invest around £3 billion in research covering the full spectrum of academic disciplines from the medical and biological sciences to astronomy, physics, chemistry, mathematics and engineering, social sciences, economics, environmental sciences and the arts and humanities.

The seven UK Research Councils are:

- Arts & Humanities Research Council (AHRC)
- Biotechnology & Biological Sciences Research Council (BBSRC)
- Economic & Social Research Council (ESRC)
- Engineering & Physical Sciences Research Council (EPSRC)
- Medical Research Council (MRC)
- Natural Environment Research Council (NERC)
- Science & Technology Facilities Council (STFC)

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