RCUK PUBLIC ENGAGEMENT WITH RESEARCH:
SCHOOL-UNIVERSITY PARTNERSHIPS INITIATIVE (SUPI)

FINAL REPORT

(COVERING THE WHOLE SUPI PROGRAMME PERIOD, YEARS 1-4)

SUPI PROJECT NAME: ENGAGING OPPORTUNITIES: CONNECTING YOUNG PEOPLE WITH CONTEMPORARY RESEARCH AND RESEARCHERS

Names of contributors to this report:

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1. The Open University; 2. Denbigh School; 3. Oakgrove School; 4. Lord Grey School; 5. St Paul's Catholic School

Figure 1: The teams, teachers, judges and support staff for the 2013 Water Rocket Competition. Photo: Mark Russell.

1: THE 'STORY' OF YOUR SUPI PROJECT

a) Please provide a narrative summary of up to 2 pages that describes the journey your SUPI project has taken from beginning to end (i.e. beginning where you started out and ending with where you have arrived), and covering all the key developments in between.

'Engaging opportunities' was born out of an existing partnership between the Open University (OU) and the Denbigh Teaching School Alliance (DTSA). Our journey has been a collective and cooperative one, characterised by our action research-informed approach. Our successes and failures are down to a small, dedicated group of university academics, teachers and support staff, with a supporting cast of many more (see Section 9), all committed to improving the aspirations and life chances of children and young people in Milton Keynes.

Our SUPI project started in a local school in Milton Keynes with the key leadership influence of an outstanding teacher. In 2012 Andy Squires, then Deputy Headteacher at Denbigh School, emailed Richard Holliman at the OU. At the time Richard was the OU's Champion for Public Engagement with Research and a key contact point for external engagement. Andy had word of a forthcoming call for proposals, a School University Partnership Initiative (SUPI). Did the OU want to be involved and who could help to put a proposal together to meet the aims of the call?

Andy's vision and enthusiasm for engaging across the DTSA, and with OU researchers, was infectious. One visit to meet Andy at Denbigh School was sufficient to convince Richard to make a case to the OU's then Pro Vice-Chancellor,

[i] This report is dedicated to the memory of Val Hawthorne who died recently. Val worked at Denbigh School for many years and was a friend and supporter of our SUPI work from the start. Among her contributions, often made behind the scenes, she was instrumental in the planning and organisation of the Water Rocket Competition (Figure 1).

Professor Tim Blackman, that working collaboratively and cooperatively to coordinate direct engagement between students, teachers, and university researchers had the potential to add value to all participating stakeholders.

With a green light to work together, Richard and Andy worked collaboratively with colleagues at the OU and DTSA to: 1. collaboratively author a proposal that met the aims of the call and the requirements of two busy and complex organisations; and 2. put together a proto-project team.

This process was made easier because we shared a vision for school-university engagement with research, one where young people are seen as key 'publics' for engaging research. From the conception of our SUPI through all stages of the project we have argued that children and young people are the pool of talent from which the next generation of expertise will develop. They are also prospective citizens with a stake in how research agendas are framed and prioritised. Furthermore, they will have some responsibility for managing the benefits and challenges that arise from the social and economic impact of these studies.

Having secured funding from RCUK for the first three years of the project (during which time Andy become Headteacher at Denbigh School and Richard was co-opted to the DTSA Strategy Board), we codified our partnership in the form of a legal contract, launched a communication strategy to raise awareness of our SUPI and to share learning from the project (see Section 4 for examples), submitted the ethics application for our action research-informed approach, registered our project in accordance with Data Protection requirements, and sought clearance for core members of the OU SUPI team to work in schools through Disclosure and Barring Service checks.

Andy formally recruited two new members of the team at Denbigh, Helen Brown (the then Deputy Director of the DTSA, now Director), and Mark Russell, who took on the role of Project Coordinator. The OU organised Visiting Status to these three teachers from Denbigh School to give them operational access to our systems with a view to improving the operational efficiency of the project (e.g. in how we shared information).

At the OU Richard formalised our research and support team, basing the project in a cross-faculty research centre, called eSTEeM with project management support from Diane Ford. Over the lifetime of the project we have worked with a wide range of researchers and support staff from across the OU, with several members of staff joining the NCCPE Public Engagement Ambassador Scheme through their SUPI work. Core members of the team are listed as contributors to this project.

With our distributed team in place at the DTSA and the OU, respectively, we began our planning in earnest mainly through formal monthly meetings. You can see the fruits of our labours in this report, notably in Sections 2, 3 and 4.

Having completed the first three years of the project we were given the opportunity to consolidate our learning, and to reinvigorate our shared vision for school-university engagement with research through a further 12 months of funded activity. This required two important changes in personnel, the first of which was facilitated by the contract between the OU and the DTSA; Mark Russell returned to full-time teaching as Head of Business and Computing at Denbigh School to be replaced by Anthony Steed. The second was an addition to the team. Trevor Collins formally joined our SUPI, principally to support our work on the Extended Project Qualification (EPQ).

Our core aims for our RCUK-funded partnership remained the same throughout the four-year project. Informed by a shared mission for social justice we have engaged students from different backgrounds whilst addressing the relevance and impact of research to them. We worked to generate awareness of the nature and challenges of contemporary research. Further, we have worked to foster and extend a culture of reflective practice around school-university engagement with research; and to embed school-university engagement with research within the OU's and DTSA's strategic planning on a sustainable basis.

With this sustainability agenda in mind we note our strategic efforts to secure a Memorandum of Understanding between the OU and the DTSA, in the first instance for a further two-year period. Operationally, we have continued to organise activities, e.g. lectures, research cafés and Maths resilience workshops. We have also trained researchers, inspiring them to work with young people and teachers from Milton Keynes. Since January 2017 we have supported around 50 postgraduate researchers in the environmental and life sciences, and we are in discussion with the newly-minted Graduate School about an OU-wide training programme. Further, members of our SUPI have continued to engage with the wider context for school-university engagement with research, notably through contributions to the HEFCE Consultation about REF 2021, and the RCUK strategy refresh for public engagement with research.

Since the conclusion of the project Anthony has coordinated a number of legacy projects, pointing to the possibility of a sustainable partnership between the OU and the DTSA. These projects have been built upon the links developed

between the two institutions and a mutually understanding as to the benefit of school-university collaboration. Two particular projects of note are the 'Open Justice' Project and the 'Managing My Money – Youth' Project.

Open Justice: As part of the OU's social justice mission, the Law School is currently developing a new pro bono initiative: Open Justice. This project aims to provide OU law students with the opportunity to engage in pro bono activities, comprising an online legal advice clinic and the delivery of public legal education projects. Building on the existing SUPI partnership between the OU and the DTSA a series of pilot sessions will be delivered to Denbigh students during March, 2017. The pilot project will then form the basis for the development of similar engagement activities in regions across the UK.

Managing My Money – Youth: This project aims to provide accessible, relevant and free personal finance education to 16-18 year olds within and outside the school environment. Building upon SUPI links between the DTSA and the OU, Denbigh School will support the development of the project in a number of ways including:

- Conduct focus group analysis with 16-18 year olds into financial education needs and study methods, accessing what content is needed and how best to deliver it;
- Undertake rigorous monitoring and evaluation of the resources and course materials from the perspective of students and teachers as end-users.

These projects demonstrate the strength of our continued partnership working. Our challenge for the future is to further cement our shared vision for school-university engagement with research across Milton Keynes, and to continue to do justice to the enthusiasm and commitment of the many students, teachers and researchers with whom we have engaged.

2: KEY FINDINGS, LEARNING POINTS AND ENGAGEMENT ACTIVITIES

a) Please list the key findings from your SUPI project

Over the four years of our SUPI, from January 2012-December 2016, we have responded to the requirements of the RCUK call for proposals, to:

- Develop an effective partnership between the DTSA and the OU to create structured, strategic, sustainable and equitable mechanisms for effective school-university engagement.
- Engage 11 schools and more than 6,577[ii] people within Milton Keynes, surpassing our target of 3,800, with authentic practices of contemporary and inspiring research in a range of academic disciplines, offering opportunities to participate in mutual learning and develop relevant and useful skills and competencies in how to access, assess, analyse and respond to contemporary research.
- Generate awareness of the nature and challenges of contemporary research through four types of activity—open lectures, open dialogues, open inquiry and open creativity—supporting those who wish to make the transition from school to university, whilst facilitating discussion about the social, economic and ethical impacts of research, developing the skills and competencies necessary to become effective citizens.
- Provide authentic role models for children and young people to aspire to, developing activities that help to build confidence and self-efficacy among students from a diversity of backgrounds and abilities.
- Inspire researchers through their work with young people and teachers from Milton Keynes, gaining experience in cutting-edge educational practices.
- Evaluate a sub-set of our activities through an action research-informed approach with a view to creating a culture of reflective and improved practice.
- Involve and support OU researchers, particularly early career researchers, to engage with school-age students and teachers through opportunities for career and professional development, rewarding and recognising them for excellence in school-university engagement with research.
- Consolidate and share the learning gained from collaborative and cooperative working across the OU, schools in Milton Keynes, the SUPI network (coordinated by the NCCPE), and the wider higher education sector.

Further to these findings, which have direct relevance to our school-university partnership in Milton Keynes, we have generated findings that have wider relevance across the sector.

[ii] This figure does not include online engagement. To date (31 March 2017) the annual STEM (formerly Science) Matters programme of lectures have generated more than 15,000 hits from more than 40 countries.

Planning for effective school-university engagement: Upstream planning for school-university engagement with research requires careful, structured thinking involving teachers, researchers and (where relevant and possible) students, supported by effective downstream project management. And yet through our work we noted a lack of suitable planning tools that work for researchers, teachers and students.

Drawing on an activity funded through the RCUK's 'Cutting Edge Research in the Classroom' Scheme, we adapted an existing planning framework (see Holliman *et al.*, 2015) to support researchers who are planning for school-university engagement with research. Following our action research-informed approach, the framework was developed collaboratively, involving researchers and teachers, and then 'road-tested' and refined. (We have also used this framework to train and support OU researchers as they plan for school-university engagement with research; see Section 8.)

Underpinned by the philosophy of pragmatism, the framework is principled in nature and designed to be applicable to any school-university activity. It is therefore designed to be flexible and adaptable, covering: preparedness, politics, people, purposes, processes and performance (Figure 2).

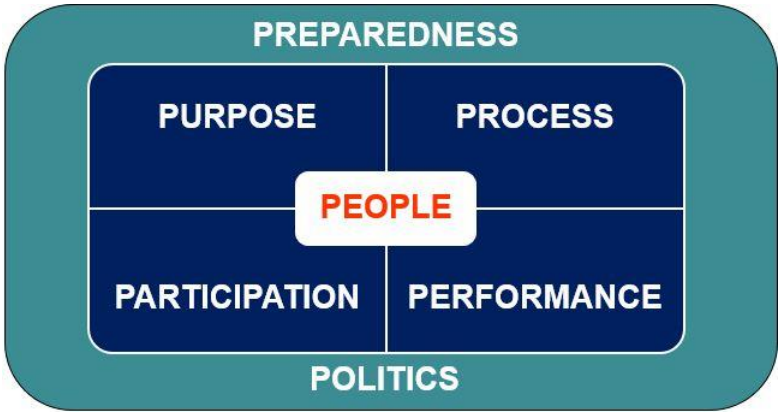

Figure 2: Planning for school-university engagement with research: preparedness, politics, people, purposes, processes and performance (Holliman *et al.*, 2016).

We shared the framework in a number of different forms, where possible under a Creative Commons licence.

The framework is discussed in detail, and with a fully worked example, as an academic paper (Holliman *et al.*, 2017). It is also available in shortened forms, e.g. as a blog post (Holliman, 2016), through slides supporting training (Holliman and Davies, 2015), and as a training leaflet (Holliman *et al.*, 2016).

Transparent justification of resources: Planning for school-university engagement with research requires a clear justification of resources that addresses questions of value-for-money for potential funders of these activities. Further, the level of commitment from each stakeholder and their institutions needs to be clear from the outset.

To address these related issues we developed a flexible and adaptable 'SUPI Metric' to make explicit the level of engagement required and to support stakeholders (i.e. teachers, pupils and researchers) in measuring that engagement. The formula for the metric is show in Figure 3.

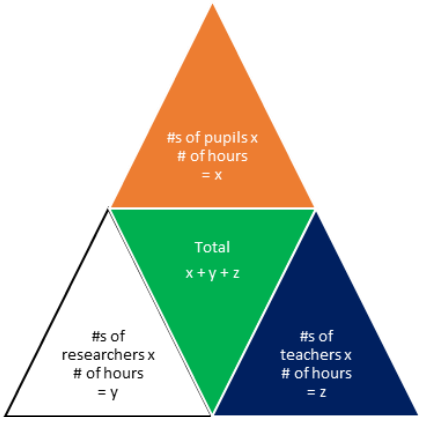

Figure 3: The formula for the 'SUPI metric' (Holliman and Davies, 2015).

The metric was published in an open access journal (Holliman and Davies, 2015; worked examples are shown in Section 3a).

b) Please list the most important learning points from your SUPI project

Culture change is needed to raise the value of school-university engagement with research: Institutional and professional cultures can be resistant to the prospect of fully embedding school-university engagement with research in a structured, strategic and sustainable manner. There are a number of reasons for this, including:

1. Confusion about the purposes of school-university engagement with research. We argue that at least three strategic purposes can be identified for SUPI:
    a. The recruitment of future university students. This activity dominates school-university engagement work, but is often related to teaching, not research.
    b. A wider 'public service' remit where students and teachers are 'informed, educated and entertained'. We note that certain activities under this purpose have the potential to extend the public service remit to also engage, e.g. some forms of citizen enquiry.
    c. To improve the quality and impacts from research, e.g. through the enactment of pathways to impact planning.

Too often the recruitment of future university students becomes the default purpose for school-university activities (see Section 3a for further discussion). The result is often that the potential to directly engage children and young people with research can be lost. It follows that the lack of clarity around the purposes for school-university engagement *with research* has resulted in a culture of confusion and ultimately a lack of progress in this field.

2. Following on from Point 1, we encountered a pre-existing academic culture where SUPI work is still seen as a 'duty', often acknowledged for being admirable in its default purpose (to recruit future students), but lacking in widely-recognised measures of esteem, not least when compared to other measures of research excellence (i.e. money and publications). Part of our rationale in adopting an action research-informed approach was to challenge this existing culture through the publication of our findings. (Further, members of our SUPI have contributed to the introduction of a new open access journal, *Research for All: Universities and Society*, where the findings from school-university engagement with research can be published.)

   With this point in mind, we note that in Year 2 of our SUPI we tried to recruit an (equivalent to) Project Coordinator (PC) at the OU to match the PC role based at the DTSA. We were unsuccessful for two reasons: a. we had no funding in place for this role; and b. even with our action research-informed approach researchers struggled to see how they could use the role to generate research outputs of sufficient quality to be entered into REF 2021.

3. Following from Points 1 and 2, we argue that SUPI work is still not routinely and consistently valued as 'core business'. To illustrate the point we received different answers to the question, "Is SUPI work?" from PhD supervisors and Line Managers. These actors are, broadly speaking, happy for SUPI activities to happen, but at a level that doesn't affect what they considered to be 'core business'. Further, we encountered a lack of obvious drivers to change this situation, not least because of the large number of competing priorities and a need to adapt to significant ongoing changes affecting the higher education sector[iii]. Notably, we also failed to identify opportunities to bid for funding at a level that could sustain the work of a SUPI beyond the four-years of part-funding provided by RCUK.
4. An important dialectical tension remains unresolved and may be unresolvable. Schools need to focus on curriculum requirements to meet the core needs of their audit culture (i.e. Ofsted inspections), whilst researchers are driven by a different but equally urgent audit culture based on the need to deliver evidence of impact directly connected with their research (e.g. REF Impact and Pathways to Impact requirements, but see also Point 1). The solution to this ongoing tension lies outside of the scope of our SUPI or the wider SUPI remit more generally.

The solutions to this broad set of challenges are neither obvious, nor guaranteed in their success. We argue that the restructuring of RCUK offers an opportunity to explore these issues in more detail and to propose a coherent sector-wide strategy for school-university engagement with research.

Communication for partnership working: Clear and regular communication between the core members of our SUPI team has been essential to the success of the project. Locating and scheduling meetings can be a challenge, particularly when team members are working part-time on SUPI from different base locations, but this is also essential for partnership working. To this end, we scheduled routine meetings out of school hours, as far as possible during term time, hosted in different locations (when possible), and organised visiting status and 'hot desking' arrangements.

Intellectual Property Rights: In co-developing the partnership agreement (in the form of a contract) between the OU and the DTSA, issues of intellectual property were raised by the OU's Contract and Legal Services team. Our solution was to agree that all parties (OU, DTSA, students) would retain ownership of any intellectual property they produced, but that by participating in the project they would also agree to license these 'products', etc. under a Creative Commons license (or similar scheme) to promote sharing and re-use. In our experience, this solution has worked well (see Section 4 for examples).

Facilitating direct engagement with authentic forms of research: We identified two new ways (to our SUPI) of successfully facilitating 'direct' engagement between researchers and school students:

1. Working with teachers to support students studying for the Extended Project Qualification;

[iii] The OU's Widening Participation agenda is framed differently to those in campus-based universities. Our core student demographic, for example, is adult learners, not school leavers. Furthermore, much of our WP commitment is at a 'national' (one country, four component 'devolved' nations), not local level.

2. The 'Labcast', where direct engagement with cutting edge research can be facilitated (Holliman *et al.*, 2017).

Both are discussed in more detail below.

c) Please list all engagement activities that were developed and run during your SUPI project

A flexible and adaptable framework for organising school-university engagement with research: To address the diversity in the academic disciplines where OU researchers are working, and the subjects that school students are taught across the DTSA, we successfully deployed a flexible and adaptable framework involving four types of activities: Open Lectures; Open Dialogues, Open Inquiry; and Open Creativity. Operationally, we found this framework to be useful when we planned for, delivered and evaluated our SUPI activities. We argue that the types of activity we have identified could be used more generally by any organisation seeking to develop school-university engagement with research.

Below we list the numbers of people engaged through our four types of activity, listed by year (Table 1). We then describe key activities for each of the four types of activity.

Table 1: The numbers of people engaged through our four types of activity, listed by year.

	Lectures	Dialogues	Inquiry	Creativity	Total by year
Year 1 (2013)	650	17	41	42	750
Year 2 (2014)	1069	91	142	36	1338
Year 3 (2015)	1787	70	727	116	2700[iv]
Year 4 (2016)	1239	104	413	33	1789
Participation by activity type	4745	282	1323	227	**Grand total 6577**

Open Lectures

We developed and delivered an Open Lecture programme in partnership with the DTSA, evaluating a sub-set of the lectures. The programme initially consisted of monthly lectures delivered at Denbigh School, combined with an annual seasonal lecture (described in more detail below). Based in part on the success of the Open Lecture programme, St. Paul's Catholic School then introduced a further programme of 'Public Understanding of Science' Lectures.

The core aims of the Open Lectures programme were to:

- inspire young people to consider a range of careers in research;
- raise awareness of different types of academic research;
- promote authentic role models of successful researchers;
- generate awareness of the nature and challenges of contemporary research.

Starting in September 2013, and running over four years until July 2017, our programme involved lectures and lecture demonstrations, aimed at pupils studying Key Stages 3, 4 and 5. More than 50% of the lectures were delivered by Open University researchers from a range of academic fields. Our aim was for OU researchers to deliver at least 24 lectures to 2400 attendees. OU lectures delivered 54 lectures to 4745 attendees (see also Footnote ii for online activity).

STEM Matters Lectures: (formerly Science Matters Lectures): We ran a series of seasonal lectures at the OU's campus in each of the four years of our SUPI partnership.

Presented in the Berrill Lecture Theatre, and as a live webcast (working with the OU's AV Team), we offered four 10 minute lectures per programme (16 lectures in total over the four years). The lectures were recorded and archived on the OU's Engaging Research blog. Our approach to organising the lectures was published as an NCCPE Case Study: Science Matters Open Lecture Programme (Section 4b includes links to resources).

[iv] The data for Year 3 have been updated since we submitted the Annual Report and Evaluation Framework for that year.

In Year 1 of our SUPI we developed a 'formula' for putting together a programme of lectures (Holliman, 2014; Figure 4). Feedback from these (and subsequent lectures) indicated this this was successful so we kept it in place.

Figure 4: The 2013 Science Matters Lecture Team: Back-row, l-r Janet Goss, Diane Ford, Gareth Davies, Andrew Norton, Janice Ansine, Simon Kelley and Tim Blackman; front-row, Frazer Bird, Clare Warren and Richard Holliman. Photo: Kate Bradshaw.

What we wanted to do was illustrate different aspects of the sciences, also technology, engineering and mathematics. In selecting the lecturers we also looked to illustrate diversity in disciplinary backgrounds and the ways that STEM researchers conduct their work. Similarly, we wanted to demonstrate different types of career where scientific training plays a central role, involving research, teaching, communication and engagement. And finally, we wanted to illustrate the different stages in a scientific career (from postgraduate research through to Professorial grade), and that these choices were equally open to women and men.

Open Dialogues

We aimed to deliver an Open Dialogues programme, drawing on established methodologies and methods developed in successful initiatives that promote discussion, interaction and deliberation (Figure 5). We wanted to give young people structured opportunities to explore the social, economic and ethical dimensions of contemporary research.

Figure 5: Dr Ellie Dommett discussing 'smart drugs' with KS 5 students, Denbigh School. Photo: Richard Holliman.

The aims of this programme were to:

- raise awareness of different types of academic research and the range of roles that researchers play within project teams and over the lifetime of an academic career;
- develop skills and competencies that empower citizenship;
- generate awareness of the nature and challenges of contemporary research; and
- introduce discussion about the social, economic and ethical impacts of research.

We wanted to encourage young people to take control of the planning and delivery of these dialogues, running 64 events in 12 schools with 960 participants. Despite considerable effort on the part of Mark Russell as the DTSA-based Project Coordinator and OU researchers (Gareth Davies, Ellie Dommett and Ann Grand), e.g. through promotional materials, workshops, and the production of a "How to…" guide and a video (Section 4b includes links to resources), we failed to meet our proposed target.

Overall, we connected with 282 participants through our Open Dialogue programme, indicating that our initial estimate was too ambitious. In practice, we found that OU researchers were encountering dialogic formats for the first time. We also struggled to generate the necessary buy-in from Senior Leadership Teams in a wide enough range of local schools, in part because the aims of our programme overlapped with those of existing activities. In effect, we argue that our proposed programme was a solution looking for a problem. Further, we found that KS5 students, who we were hoping to support in organising the cafés, also had multiple, pre-existing priorities. Taking on the organisation of these events was not seen as an aspirational and rewarding activity.

Open Inquiry

We developed and delivered a diverse Open Inquiry programme involving pupils from Key Stages 3, 4 and 5. This included a wide range of research-based activities, a sub-set of which we evaluated. Our aim was to deliver inquiry-based activities to 312 students. In contrast to the challenges we faced in develop our programme of Open Dialogues, we delivered our Open Inquiry programme to 1,323 people, more than 1,000 beyond our target. Part of the reason for this was the enthusiasm for inquiry-based activities shown by OU researchers, which was closely matched by Senior Leadership Teams in local schools.

The core objectives of the Open Inquiry programme were to:

- inspire young people to consider a range of careers in research and raise ambition to succeed in these ends;
- raise awareness of different types of academic research; and
- generate awareness of the nature and challenges of contemporary research.

Over the course of our SUPI, we made connections with existing schemes, including the Nuffield Research Bursaries (e.g. Patel, 2015; Mundy, 2014). We also responded to the needs of local schools, for example, through our work in support of the Extended Project Qualification, contributed to funding applications, such as the Enigma Maths Hub, and developed new partnerships, including with the Brilliant Club (e.g. Forbes, 2013).[v] Examples of activities developed and delivered through our Open Inquiry programme are listed below.

Water Rocket Competition: Drawing on learning from a previous Wellcome Trust-funded project we ran a BBC *Rough Science*[vi]-inspired 'Water Rocket' Competition in each of the four years of our SUPI partnership. Hosted at Denbigh School each competition invited up to six teams of Year 9-10 students from schools to design and launch water rockets using scientific principles (Figure 6).

Figure 6: The 2016 Water Rocket Competition. Dr Vic Pearson (The Open University) and Dr Leanne Gunn (Science Made Simple) assist the students with the launchers. Photo: Gareth Davies.

The students adapted their designs incrementally based on data collected from each test launch. From this they were asked to design and build two water rockets, one to fly the furthest horizontal distance, the other to hit a target.

The teams were guided by local teachers and Open University researchers, including researchers from the School of Physical Sciences. For more details about the 2016 competition, see: Milton Keynes students are out of this world.

Extended Project Qualification: Collaborative working involving teachers and researchers allowed us to identify complementary needs in Years 3 and 4 of our SUPI.

We found that Heads of Sixth Form were looking for additional support for KS 5 pupils undertaking the Extended Project Qualification (EPQ).

We addressed these complementary needs by working together to provide supplementary support for the EPQ to more than 480 Key Stage 5 students from 12 schools in Milton Keynes (Figure 7).[vii]

Figure 7: Denbigh School Media Students interviewing EPQ students from Lord Grey School. Photo: Richard Holliman.

We worked closely with a number of teachers, notably Joe Kendall (Oakgrove School), Penny Green (Lord Grey School) and Damien Sharp (St. Paul's Catholic School), whilst supporting hundreds of students as they explore the research cycle, developing, investigating and reporting the findings from their studies.

For more details of our approach, see Empowering lifelong citizenship (Section 4b includes links to resources).

[v] We note that our original plan to connect local students with the OU's Science Short Modules failed as they were discontinued following the UK-wide introduction of increased student fees.

[vi] Rough Science was a BBC/Open University co-production. Running for six seasons from 2000-2006, the show set scientists challenges that they would solve using everyday items and equipment. Mike Bullivant, an OU scientist (now retired) and one of the presenters on the show, helped to design the Water Rocket Competition and produced some of the equipment we use.

[vii] In our experience, support for the EPQ requires flexibility on the part of the researcher, a willingness to go beyond their research topic to support KS5 students who select their own topics to investigate. When recruiting researchers to these roles we made arguments that they would develop skills and gain experience of teaching in classroom settings.

Labcast: OU researchers and teachers from Denbigh School developed and delivered a 1-hour physics lesson to an A-level class of 25 Denbigh School students from a laboratory at the Open University's campus (Figure 8).

The Labcast allowed cutting edge research—involving an ESA-funded Rosetta Mission scientist who had been involved in the design and build of the OU's Ptolemy instrument on-board Rosetta's Philae lander—to be beamed directly into a local school.

Through this activity both the teacher and researcher also developed additional skills and expertise (Holliman *et al.*, 2017; Pearson, 2016; see Section 3a for discussion of the evaluation and Section 4b for resources).

Figure 8: Dr Simon Sheridan (OU) and Jenny Hallam (DTSA) delivering the 'labcast'. Photo: Vic Pearson.

Enigma Maths Hub—promoting resilience: During the academic year 2015-16, Dr Clare Lee, an expert form the Open University in Mathematics resilience, worked with a group of 22 teachers from 12 different schools (primary and secondary) across the Enigma Maths Hub (Figure 9).

The purpose of the programme was to support teachers in applying some of the ideas from research about Maths resilience to their practice and therefore to improve the classroom experiences of children learning Maths. For further details about this activity, see Lee, 2016.

Figure 9: Concepts relevant to understanding resilience in Mathematics.

Open Creativity

Through our Open Creativity programme we delivered a series of activities to support the development of transferable skills in communication, creativity, design, and media literacy. Our aim was to deliver creative activities to 200 students. We delivered our Open Creativity programme to 227 people.

The core aims of the Open Creativity programme were to:

- raise awareness of different types of academic research;
- develop skills and competencies that empower citizenship and facilitate media literacy, offering opportunities to participate in activities that improve skills and competencies in accessing, assessing, analysing and responding to aspects of contemporary research;
- build confidence and self-efficacy among students from a diversity of backgrounds and abilities.

Media training: We ran five media training courses over the four years of our SUPI, each with 10 KS 5 students (Figure 10).

The training was led by experienced media professionals, working with teachers from local schools and OU researchers.

Over the five days of the courses students developed and practised new skills, such as working with digital tools and technologies, producing pieces to camera, and editing footage.

Figure 10: Media Training, December 2016: l-r, Pippa Jennings (Teacher), Year 12 Students from Denbigh School, Gerard Giorgi-Coll (Editor), Dr Janet Sumner (Executive Producer) and Kerry Reid (Assistant Producer and Postgraduate Research Student). Photo: Richard Holliman.

The films, which cover topics as diverse as space science, the representation of scientists in popular media, educational technology, how to run a research café and studying for the EPQ, are listed in Section 4b.

Imagining Scientists: We delivered a one-day workshop with 30 Year 7 students from Denbigh School in Milton Keynes, exploring stereotypes of scientists. The activity was based on a previous research project called Invisible Witnesses. Students were given opportunities to develop skills in media literacy, e.g. by assessing stereotypical images of scientists in popular media, then producing ideas for television programmes that promote STEM subjects in ways that are meaningful to audiences from different backgrounds. We also produced a teaching pack to allow teachers in other schools to run this activity, along with two videos produced by sixth-formers (Whitelegg *et al.*, 2014; see Section 4b for resources).

Design activity: We developed a series of six linked, collaborative interventions, working with school students from Milton Keynes and Open University researchers. Our aim was to co-design artefacts that would represent our SUPI project (Figure 11).

The students designed wristbands to represent desirable attributes they wanted to see during school-university engagement activities. They called for researchers to be positive, inquisitive imaginative and creative, a far cry from narrow framings of school-university engagement as a recruitment activity (see Sections 2b and 3a).

This activity has been promoted as a 'best practice' case study by the National Coordinating Centre for Public Engagement (Collins *et al.*, 2015 ; see Section 4b for resources).

Figure 11: Peter Devine facilitating the design activity with Denbigh students, Trevor Collins and Richard Holliman. Photo: Mark Russell.

3: THE IMPACT AND INFLUENCE OF YOUR SUPI PROJECT

a) Please summarise the impact(s) of your SUPI project across its lifetime

Influencing policy and professional practice

What are the purposes of school-university engagement with research? We outlined a shared vision for our SUPI when we put our proposal together, a vision where young people are seen as key 'publics' for public engagement with research activity. Students and teachers, in particular, appeared to share this vision.

This vision, made manifest through our strategic planning and operational practices and encapsulated in blog posts (e.g. Holliman, 2016; 2014), required an ongoing commitment to diversity and inclusion, conceptualising students as prospective citizens with a stake in how research agendas are framed and prioritised.

Figure 12: We asked students what attributes they wanted to see in university researchers visiting their school. They responded: be positive, inquisitive imaginative and creative (Collins *et al.*, 2015). Photo: Mark Russell.

We have found that this vision can be in conflict at times with political agendas, institutional imperatives, funding priorities, and the professional practices of some researchers (e.g. Jensen and Holliman, 2016). We have worked through our SUPI to address these ongoing challenges, principally though work with funders and the NCCPE, but also through training and support (see Section 8), and the sharing of our action research-informed findings (see Section 4). Further, our SUPI has offered OU researchers opportunities to learn from teachers and students working in local schools, and to generate evidence of social and economic impacts from research (Figure 12).

Is this still a problem? A recent example further illustrates the challenge we continue to face as reflective practitioners in this field. "Your local university needs you!" could have been the headline on the recent *Guardian* article about the RCUK-funded School-University Partnership Initiative (SUPI).

There is much to commend in the article and in the activities fellow SUPIs have developed, delivered and assessed over the previous four years. However, we argue that framing the diversity of SUPI approaches and purposes so narrowly, as if university researchers are the recruiting sergeants for their institutions, does not do our work or the more diverse purposes of this RCUK-funded initiative justice.

We argue that the call to recruit rather than engage, too often becomes the default purpose for school-university engagement with research. The vision for school-university engagement with research requires a clear and consistent message that goes beyond the limited rationale of "putting bottoms on the seats of the lecture halls of the future" if we are to do justice to the broader agenda that RCUK originally envisioned for SUPI.

To this end, members of our SUPI have worked with public funders for research, the NCCPE and other SUPIs (e.g. Collins *et al.*, 2017) throughout our four-year project, to promote a broad agenda for school-university engagement with research. Key highlights include: sharing our learning with STFC and NERC as they produced fresh strategies for public engagement, support for an STFC Working Group that explored the attitudes, culture and ethos of physical science researchers in relation to public engagement, written evidence submitted to the House of Commons Select Committee Inquiry on Science Communication, and to the HEFCE Consultation about REF 2021 (Holliman, 2017). Holliman will continue to promote the principles and reflective practices of our SUPI in the future, e.g. through his role on STFC's Advisory Panel for Public Engagement, and through the forthcoming RCUK Public Engagement with Research strategy refresh.

Changes, benefits and/or effects to public engagement with research

Table 1 (Section 2c) provides an overview of the numbers of people we have engaged through our SUPI. This is broken down by types of activity, and listed by year. Overall, we have worked with 11 schools and engaged more than 6,577 people within Milton Keynes, surpassing our target of 3,800 (see Footnote ii for data relating to online engagement).

Reach vs. depth of engagement: We note that these data are skewed; far more people, >70%, engaged with our lecture programme when compared to the other three activities. It is therefore important to acknowledge the challenge of justifying reach (large numbers) against depth of engagement, noting that greater depth of engagement is likely to produce more significant changes, effects and/or benefits to those engaging (Holliman, 2017; Holliman and Davies, 2015).

A typical presentation in our Open Lecture programme involves around an hour-long commitment of time. Using our 'SUPI Metric' formula (Figure 3) this would equate to around 4745 hours of engaged time. In contrast, if we compare this figure with the total number of hours committed to one of the media training workshops (around 676 hours; (Figure 14) and then multiple this by the number of workshops we ran (n=5), the overall figure is around 3380 hours of engaged time, but with 50 students.

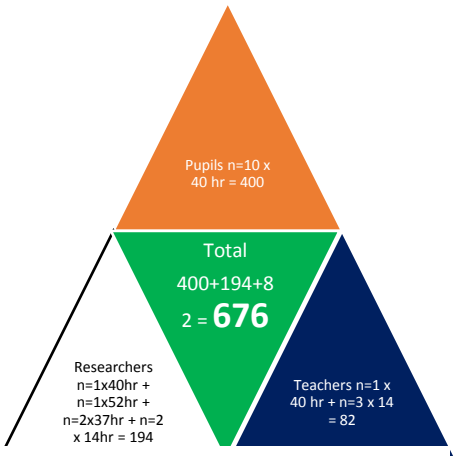

Figure 13: The 'SUPI Metric' Calculation for a media training workshop.

We argue that in-depth activities have the greatest chance of increasing self-efficacy of students in how they interact with researchers and respond to contemporary research in meaningful ways. This requires that research funders have consistent and equitable measures to judge value-for-money in how researchers plan pathways to research impact involving school-university engagement with research.

Holistic planning and evaluation

Our SUPI proposed an action research-informed approach, evaluating a sub-set of our activities. We have developed, tested and refined an approach based on holistic planning for school-university engagement with research where evaluation is incorporated from the start (Holliman *et al.*, 2017). To illustrate this approach we offer a worked example, using the Labcast, one of our Open Inquiry activities. Throughout this activity we collected evaluation evidence of performance from the pupils, teacher and researcher.

Figure 14 (overleaf) summarises our evaluation strategy, identifying pre- and post-Labcast measures of the teacher's, researcher's and students' experiences.

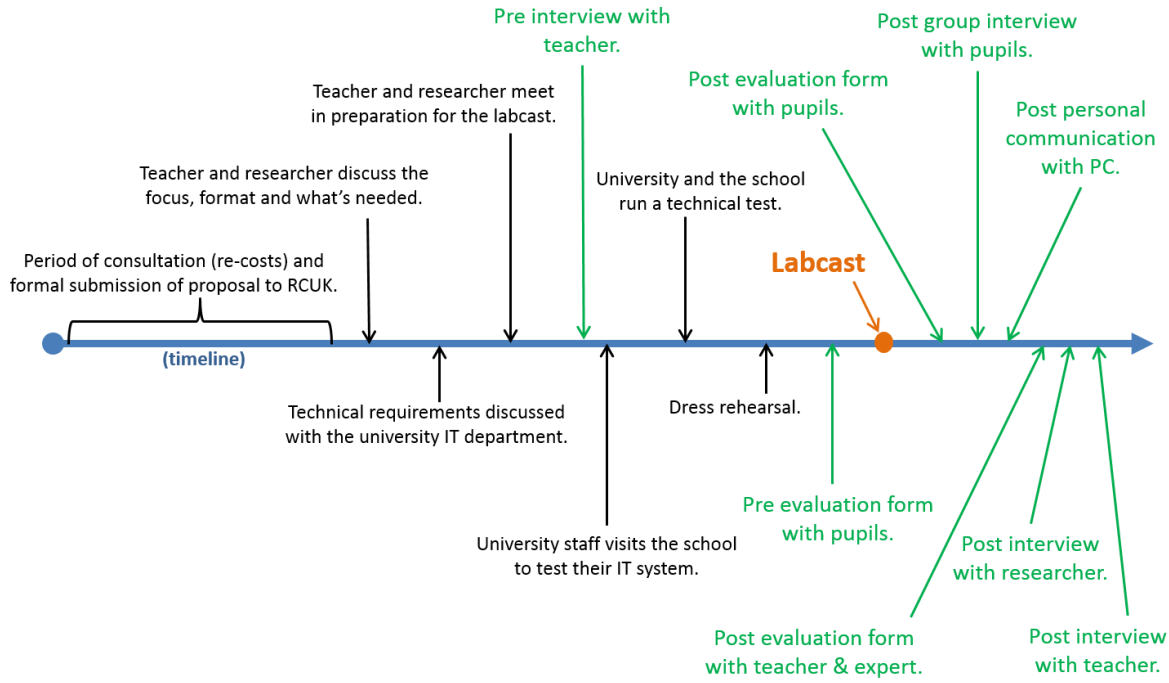

Figure 14 Timeline of the evaluation activities (in green), mapped against the events leading up to a Labcast activity (in black). (PC = Project Coordinator.)

Our goals were to evaluate the challenges and impacts of giving students an authentic experience of engaging with research scientist in their laboratory; providing the opportunity to engage with cutting-edge science within the curriculum; and providing development opportunities for teachers and researchers.

In total there were seven OU staff (including a project coordinator, technical staff and a research scientist); five teachers (an early career physics teacher in the Open University laboratory, and a senior leader, the Project Coordinator, and two teachers supported at the school); and 25 students (all of whom were in Year 12 studying A-level Physics at the time of the Labcast). Using our 'SUPI Metric' formula (Figure 15) the Labcast equates to around 273 hours of engaged time, much of which involved OU researchers and teachers.

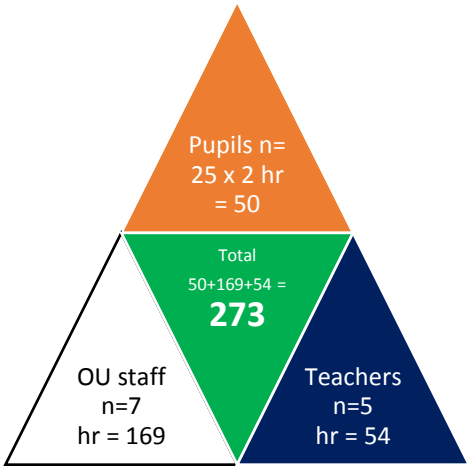

Figure 15: The SUPI metric calculation for the Labcast activity.

The Labcast was designed to offer students an authentic experience of research by engaging them via a webcast with a professional scientist from a research laboratory in the university. The format was designed demonstrate how equations taught at A-level Physics had been used to calculate the landing of the *Philae lander* on a Comet (67P/Churyumov-Gerasimenko); hence, bridging the divide between theory and practice.

For the purposes of evaluation we chose to focus our efforts on gathering insights from the physics teacher, the research scientist, and the students. By carrying out pre- and post-interviews with the physics teacher we learnt that, from their perspective, the Labcast had met the key objectives. It helped them move beyond the "*very theoretical*" to the more practical and tangible understanding of *"a real life research situation"*. They explained that a conventional lesson can fail to get students to *"think about the wider picture"*, but said that the Labcast was an effective mechanism for *"inspiring students and also demonstrating subject knowledge as well, good subject knowledge.*"

From pre- and post-evaluation forms and a post-group interview with the students we learnt that from their perspective the Labcast had also met the key objectives, "*The amount we learnt in the labcast I would say would normally take us about three lessons"; "It's more enjoyable [than a lesson], something that helped stick in the brain"*. Moreover, the teacher explained that the students will have benefited by getting, "*to see behind the scenes [⋯] [and] some of the real difficulties which are in planning an actual science mission"*.

The teacher explained that the students also got to experience a *"lightbulb moment"* when they understood that the researcher was "*just like anyone else"*, and it increased the students' awareness of the large time frames and costs characterizing contemporary research. We learnt that for some students, this changed their perspectives of a researcher's role from that of "*drinking coffee and talking*" to "*demanding but rewarding*". It provided students with *"a more in depth knowledge of how research works"*, boosting some of the students' confidence in their ability to succeed in a research career. Yet for others, it just changed the off-putting factors of being a researcher from "*boring*" and "*underpaid*" to "*amount of qualifications*", "*deadlines"* and "*dedication to specific field*".

One of the objectives of the activity was to give the teacher opportunities to update their knowledge; empowering them to encourage students to explore scientific developments and associated social and economic issues. This resulted in students understanding of the opportunities that were available to them. "*I didnt really know there were so many different aspects that you could actually go into in a project like that*". For others, it helped them to understand the role they could play in science. "*For me, I always wanted to pursue a career in engineering. I thought that engineering was kind of sectioned off from the science 'till I saw how they were talking about how engineers were saying different things to them […] its opened another door for me or another options which I could take*".

The planning and hosting of the Labcast was intended to provide development opportunities for the teacher and researcher. From the teacher's perspective we learnt that this was achieved in the planning stage by demonstrating the ability to incorporate factors such as "*action learning*" into the lesson plan. Having taken part in the Labcast, the teacher said the experience of engaging with the contemporary research and researcher was valuable in itself because it had given them ideas of how they might improve their style of teaching. "*I think I am going to try and link more up-to-date research and discoveries into topics that I teach if they are suitable so that the students are aware of areas which are current because I think that's part of what engaged them*".

In a post-Labcast interview with the researcher we learnt that from their perspective the Labcast offered valuable development opportunities for a research career because of how it, *"hinge[s] on being able to […] to get complicated ideas and concepts across […] to people who may have never seen these things or heard of these things before*". In particular, we learnt that the planning stage offered the opportunity to learn about teaching in a school context. "*I think it's ways of trying to tie into the curriculum stuff that's happening out in the big wide world"*.

In summary, we argue from an action research perspective that evaluation should inform critical reflection and changes in practice (Holliman *et al*., 2017). From the evaluation we learnt a number of lessons to consider before planning future Labcasts. The planning phase was crucial. The teacher and researcher went through a process of having to redefine their preconceived idea of what role they would play and what they hoped to gain from their experience. We also learnt that students didn't really know what to expect. Better information prior to the Labcast could help with this in future. Pragmatically, we experienced a tension between quality and informality and authenticity, for example, in deciding to have 'messy' laboratory versus a studio set up.

b) Please summarise any influence your SUPI project has had on your institution, its culture, or that of any other institutions, cultures and projects/initiatives.

Denbigh Teaching School Alliance

From the perspective of the DTSA, the SUPI project has proven to be an incredibly rich source of opportunity for both teacher and student alike (Brown, 2016; Squires, 2014). The variety of projects have enabled a diverse group of students from across the schools in Milton Keynes to develop their learning *beyond the* confines of a classroom and course syllabus. The SUPI projects have helped to inspire a thirst for engagement amongst students and teachers and provided them with experiences that will stay with them beyond full time education. As an example, students attending the Brilliant Club activity said that, whilst their experience had reaffirmed their aspirations and reassured them that they were on the right pathway, it had also opened their eyes to research and the interest this had given them for studying the sciences.

Through the SUPI projects teaching staff at schools across Milton Keynes have been able to work cooperatively and collaboratively with academics from a range of disciplines, enabling them to update and to develop their own subject knowledge, and use this to enrich the lessons that they deliver to students. As an example, teachers who accompanied Denbigh School students to the Science Matters lectures in 2015 expressed an interest in developing their own external links with the academic community.

Another short term, and potentially longer term, impact of our SUPI partnership is with regards to supporting schools in their participation in trips and educational projects. Discovering and developing external links for projects and visits is becoming increasing difficult in a climate where shrinking school budgets means that such trips and projects must provide demonstrable value for money. Our SUPI project has provided a range of cost effective opportunities within a culture of city-wide collaboration. With this in mind we note that, of the schools that took part in activities such as STEM Lectures or Research Cafés, the schools often opted to take part in further activities.

Overall, our SUPI partnership has given schools across Milton Keynes structured opportunities to access the expertise of academics and has served to develop links and partnerships that will last beyond the life span of this project. To this end, the DTSA worked with our OU SUPI colleagues to develop a Memorandum of Understanding (MoU), which we would be delighted to sign so that we have a strategic base from which to continue our work in the future.

The Open University

A key focus of our work in Year 4 has been to secure a strategic commitment for sustaining the OU's contribution to our SUPI work beyond 2016. We have addressed this challenge by taking the widest possible view of school-university engagement (with research), collaboratively developing a MoU for discussion across different OU units. As a result, our Faculty of Well-being Education and Language Studies have agreed to sign-up to the MoU, in a clear commitment to work with school teachers on research in the School of Education, Youth, Childhood and Sport. We are still in discussion with other OU Faculties, notably in the Faculty of Science, Technology, Engineering and Mathematics where we have proposed a strategy for engaged research, covering a range of strategic external activity, including SUPI. OpenTEL,[viii] a recently identified priority research area for the University, is working with the ideas emerging from SUPI to develop a vision of open engaged research. Further, we are continuing discussions with our Office of Research and Academic Strategy, with a view to securing a strategy and ongoing leadership role for SUPI at the OU. Notably, we recently secured funding to offer intense, residential-based training for up to 30 environmental scientists, and we are in discussion with our Graduate School to develop an OU-wide programme of training and support.

We also note work in the School of Physical Sciences (SPS), which has a long-standing, embedded and commendable commitment to widening participation in the physical sciences. This emphasis on widening participation in SPS reflects wider, long-standing concerns about: 1.) the uptake of qualifications in the physical sciences; and 2.) specific issues about girls and women studying the physical sciences at tertiary level. The result is that school-university "outreach" (i.e., not necessarily direct engagement with research) is embedded in SPS, e.g. through teaching initiatives with the Ogden Trust and membership of SEPnet and other 'public service' activities (see Section 2b). This context for school-university engagement (with research) broadly matches that identified recently by STFC's PEACE Report (see also Holliman, 2016).

There is work still to be done if we are to catalyse change within the OU and more widely across the HE sector and schools to embed a sustainable, strategically-informed culture of reflective practice, creating the conditions where the UK will become internationally recognised for excellence in school-university engagement with research. We argue that through our SUPI work we have contributed significant leadership to influence the changes required in how school-university engagement with research is conceptualised, both at the OU and more widely, how it is funded and in what counts as excellence.

4: PUBLICATIONS AND PRODUCTS

a) Please list any publications that have resulted from your SUPI project (can include formal and informal; please ensure each item is referenced with date, authors, journal etc. or other source if informal).

We have consolidated and shared the learning from our SUPI through a sophisticated and coordinated communication strategy involving publications, conference papers and posters, workshops, pamphlets, blog posts and via social media.[ix] Wherever possible we have made our publications and products available under licences that promote sharing and re-use.

[viii] OpenTEL stands for Open Technology-Enhanced Learning.

[ix] Social media contribution are not listed as these were made predominantly through Twitter, e.g. see https://twitter.com/science_engage combined with #SUPI.

Publications

Holliman, R., Davies, G., Pearson, V., Collins, T., Sheridan, S., Brown, H., Hallam, J. and Russell, M. (2017, in press). 'Planning for engaged research: a collaborative 'Labcast'', in Kucirkova, N. and Oliver Quinlan, O. (eds.) *The Digitally Agile Researcher*. Open University Press, Maidenhead.
Available from: http://www.open.ac.uk/blogs/per/?p=7348

Holliman, R. and Warren, C.J. (2017). 'Supporting future scholars of engaged research', *Research for All: Universities and Society*, **1**(1), pp. 168-184. Available from: http://oro.open.ac.uk/48223

Jensen, E. and Holliman, R. (2016). Norms and values in UK science engagement practice. *International Journal of Science Education, Part B Communication and Public Engagement*. **6**(1) pp. 68–88.
Available from: http://oro.open.ac.uk/41889

Holliman, R. and Davies, G. (2015). Moving beyond the seductive siren of reach: planning for the social and economic impacts emerging from school-university engagement with research. *JCOM* **14**(03), C06, pp. 1-10. Available from: http://oro.open.ac.uk/44415

Conferences

Collins, T., Bryan, S., Cripps, E., Davies, G., Houghton, A.M., Russell, M., Spurrell, J. and Taylor, J. (2016). 'The Dragons' Den of School Partnership Sustainability'. Workshop at the NCCPE Engage Conference 'Inspiring Innovation'; Bristol, United Kingdom, 29-30 November.

Davies, G. (2016). 'Do It Yourself Wireless Networking for Location-based Collective Awareness'. Presentation at the NCCPE Engage Conference 'Inspiring Innovation'; Bristol, United Kingdom, 29-30 November.

Dohaney, J., Medvecky, F., Priestley, R., Holliman, R., Brogt, E., Galloway, C., Herbulock, D. and Knapen, M. (2016). 'Science communication education and training: How are we preparing the next generation of science communicators?' Science Communicators Association of New Zealand (SCANZ) Annual Conference. Otago Museum, Dunedin, New Zealand, 14-16 November.

Collins, T., Pearson, V., Davies, G., Sheridan, S., Holliman, R., Brown, H, Russell, M., Hallam, J. and Steed, A. (2016). 'Using Live Video Conferencing to Enable Authentic School-University Engagement'. Presentation at Science in Public, 2016; University of Kent, Canterbury, 13-16 July.

Collins, T., Pearson, V., Davies, G., Sheridan, S., Holliman, R., Brown, H., Russell, M. and Hallam, J. (2016). 'Labcasts: Bringing cutting edge science into the classroom'. Poster presented in the 14th International Public Communication of Science and Technology Conference: 'Science communication in a digital age'; Istanbul, Turkey, 26-28 April.

Holliman, R. (2014). 'Engaging research: connecting theory and practice', Engaged Practice Learning Exchange, National Coordinating Centre for Public Engagement, Marriott Royal Hotel, Bristol, 2 December.

Holliman, R., Davies, G., Sumner, J., Squires, A., Brown, H. and E. Scanlon (2014). 'Engaging opportunities: Developing a school-university partnership to connect young people and teachers with researchers.' Presented at the 13th International Public Communication of Science and Technology Conference: 'Science communication for social inclusion and political engagement'; Salvador (Bahia), Brazil, 5-8 May.

Workshops and Events (not discussed elsewhere in this report)

Holliman, R. (2016). 'Assessing excellence in educational research.' Denbigh Teaching School Alliance Teach Meet, Denbigh School, Milton Keynes, 28 June.

Holliman, R. and Davies, G. (2015). 'Can we move beyond the seductive siren of reach?' SUPI Coordination Meeting, National Coordinating Centre for Public Engagement, NCVO, London, 16 June.

Davies, G. and Holliman, R. (2014). 'A strategic approach for evaluating public engagement with research'. Engaging Research Seminar, KMi Podium, The Open University, Milton Keynes, 14 July.
Available from: http://www.open.ac.uk/blogs/per/?p=4018

Holliman, R. (2013). 'Engaging Opportunities'. Contribution to an NCCPE/SUPI Lunchtime Seminar at RCUK Headquarters, Swindon, 19 November.

Holliman, R. (2013). 'Engaging opportunities: connecting young people with contemporary research and researchers', presented to the meeting of Deans, Associate Deans Research and Research Centre Directors, Walton Hall, The Open University, Milton Keynes, 25 April.

Holliman, R. (2013). 'Engaging Opportunities: a hive of activity', presented at the NCCPE-hosted, SUPI Launch Meeting, Woburn House Conference Centre, London, 25 June.

Project Reports

Lee, C. (2016). *Developing Mathematical Resilience: Teachers' reflections on working to develop mathematical resilience in learners*. Enigma Mathematics Hub, Milton Keynes.
Available from: http://www.enigmamathshub.co.uk/copy-of-enigma-teaching-for-mastery

Holliman, R., Davies, G., Steed, A., Pearson, V., Ford, D., Sumner, J., Stutchbury, K., Lee, C., Brown, H., Collins, T., Kendall, J., Green, P., Squires, A., and Braithwaite, N. (2017). *Year 4 Report for "Engaging Opportunities"*. The Open University's School-University Partnership Initiative (SUPI). Produced for Research Council UK's Public Engagement with Research Network and the SUPI Advisory Board.
Available from: http://www.open.ac.uk/blogs/per/?p=7416

Davies, G., Holliman, R., and Steed, A. (2017). *Year 4 Evaluation Framework for "Engaging Opportunities"*. The Open University's School-University Partnership Initiative (SUPI). Produced for Research Council UK's Public Engagement with Research Network and the SUPI Advisory Board. Available from:
http://www.open.ac.uk/blogs/per/?p=7415

Holliman, R., Davies, G., Russell, M., Steed, A., Pearson, V., Ford, D., Dommett, E., Brown, H., Collins, T., Squires, A. and Braithwaite, N. (2016). *Third Year Report for "Engaging Opportunities"*. The Open University's School-University Partnership Initiative (SUPI). Produced for Research Council UK's Public Engagement with Research Network and the SUPI Advisory Board. Available from: http://www.open.ac.uk/blogs/per/?attachment_id=6822

Davies, G., Holliman, R., Brown, H., Russell, M. and Steed, A. (2016). *Year 3 Evaluation Framework for "Engaging Opportunities"*. The Open University's School-University Partnership Initiative (SUPI). Produced for Research Council UK's Public Engagement with Research Network and the SUPI Advisory Board.
Available from: http://www.open.ac.uk/blogs/per/?attachment_id=6823

Holliman, R., Davies, G., Russell, M. and Pearson, V. (2015). *Second Year Report for "Engaging Opportunities"*, including editing of one case study and editing on another; co-author of evaluation framework. The Open University's School-University Partnership Initiative (SUPI). Produced for Research Council UK's Public Engagement with Research Network and the SUPI Advisory Board.

Holliman, R. (2014). *Second Year Report for "An open research university"*, including editing of two case studies, The Open University's Public Engagement with Research Catalyst. Produced for Research Council UK's Public Engagement with Research Network.

Holliman, R. (2013). *First Year Report for "Engaging Opportunities"*, including authoring of two case studies, The Open University's School-University Partnership Initiative (SUPI). Produced for Research Council UK's Public Engagement with Research Network and the SUPI Advisory Board.

Blog Posts

We have authored or commissioned and edited more than 40 blog posts (approx. 1 per month over the lifetime of our SUPI). The authors include students, teachers, OU researchers and support staff, interns, and other members of the wider SUPI family. Several of the students and OU researchers produced their first ever blog post for our SUPI.

Holliman, R. (2017). 'Moving school-university engagement beyond the role of recruiting sergeant.' Engaging Research Blog. 3 April. Available from: http://www.open.ac.uk/blogs/per/?p=7437

Lee, C. (2017). 'Developing mathematical resilience in teachers.' Engaging Research Blog. 22 March.
Available from: http://www.open.ac.uk/blogs/per/?p=7418

Holliman, R. (2017). 'Assessing excellence in research impact.' NCCPE Blog. 23 February. Available from:
https://www.publicengagement.ac.uk/blog/assessing-excellence-research-impact

Collins, T. (2017). 'The Dragons' Den of School Partnership Sustainability.' Engaging Research Blog. 25 January. Available from: http://www.open.ac.uk/blogs/per/?p=7364

Wood, E. (2017). 'Mountains under the microscope: Unlocking the secrets of the Himalaya.' Engaging Research Blog. 3 January. Available from: http://www.open.ac.uk/blogs/per/?p=7321

Holliman, R. (2016). 'Give PEACE a chance.' Engaging Research Blog. 15 December. Available from: http://www.open.ac.uk/blogs/per/?p=7221

Holliman, R. (2016). 'Planning for a principled approach to engaged research.' Digitally Agile Researcher Blog. 13 December. Available from: http://www.digitallyagile.com/?p=130

Holliman, R. (2016). 'Empowering lifelong citizenship.' Engaging Research Blog. 26 October. Available from: http://www.open.ac.uk/blogs/per/?p=7197

Holliman, R. (2016). 'Milton Keynes students are out of this world.' Engaging Research Blog. 20 July. Available from: http://www.open.ac.uk/blogs/per/?p=7022

Holliman, R. (2016). 'What has science communication ever done for us?' *The Guardian: Science Policy Blog*. 10 May. Available from: https://www.theguardian.com/science/political-science/2016/may/10/what-has-science-communication-ever-done-for-us

Holliman, R. (2016). 'What has science communication (and engagement) ever done for us?' Engaging Research Blog. 10 May. Available from: http://www.open.ac.uk/blogs/per/?p=6963

Pearson, V. (2016). 'Labcasts: Bringing cutting edge science to the classroom.' Engaging Research Blog. 1 March. Available from: http://www.open.ac.uk/blogs/per/?p=6789

Brown, H. (2016). 'Engaging schools with research opportunities.' Engaging Research Blog. 1 February. Available from: http://www.open.ac.uk/blogs/per/?p=6772

Dommett, E. (2016). 'Engaging with neuropharmacology research.' Engaging Research Blog. 4 January. Available from: http://www.open.ac.uk/blogs/per/?p=6751

Holliman, R. (2015). 'Towards a scholarship of engagement.' Engaging Research Blog. 11 November. Available from: http://www.open.ac.uk/blogs/per/?p=6670

Holliman, R. (2015). 'Valuing engaged research.' Invited article for *Euroscientist Webzine*. 4 November. Available from: http://www.euroscientist.com/valuing-publicly-engaged-research

Kemp, C. (2015). 'Science communication for development.' Engaging Research Blog. 21 October. Available from: http://www.open.ac.uk/blogs/per/?p=6582

Pathmanathan, S. (2015). Children's science television: then and now.' Engaging Research Blog. 5 October. Available from: http://www.open.ac.uk/blogs/per/?p=6540

Patel, J. (2015). 'Monsoon evolution.' Engaging Research Blog. 22 September. Available from: http://www.open.ac.uk/blogs/per/?p=6463

Montoya, E. (2015). 'Back to the future II: Mad for mud!' Engaging Research Blog. 22 September. Available from: http://www.open.ac.uk/blogs/per/?p=5435

Rothery, D. (2015). 'Mercury: new views on the Sun's most innermost planet.' Engaging Research Blog. 27 January. Available from: http://www.open.ac.uk/blogs/per/?p=5337

Walker, M. and Martí Pete, D. (2015). 'Code-breaking challenges.' Engaging Research Blog. 26 January. Available from: http://www.open.ac.uk/blogs/per/?p=5346

Schwenzer, S. (2014). 'From analogue missions to digital communication…' Engaging Research Blog. 24 October. Available from: http://www.open.ac.uk/blogs/per/?p=5118

Walker, M. and Trott, V. (2014). 'Our Brilliant Club PhD student internships.' Engaging Research Blog. 2 October. Available from: http://www.open.ac.uk/blogs/per/?p=5001

Mundy, F. (2014). 'Feel the width: happier shells are thicker.' Engaging Research Blog. 23 September. Available from: http://www.open.ac.uk/blogs/per/?p=4922

Brooking, F. and Luwaca, N. (2014). 'Imagining scientists in popular culture.' Engaging Research Blog. 19 September. Available from: http://www.open.ac.uk/blogs/per/?p=4721

Gunn, L. (2014). 'MK students are go for launch…' Engaging Research Blog. 11 September. Available from: http://www.open.ac.uk/blogs/per/?p=4485

Squires, A. (2014) 'School-University Engagement: What's in it for schools?' Engaging Research Blog. 7 August. Available from: http://www.open.ac.uk/blogs/per/?p=4269

Carr, J. (2014). 'The life of an OU intern – Engaging Research Week 3.' Engaging Research Blog. 7 August. Available from: http://www.open.ac.uk/blogs/per/?p=3919

Holliman, R. (2014). 'Walton High Students show star qualities.' Engaging Research Blog. 5 August. Available from: http://www.open.ac.uk/blogs/per/?p=4109

Carr, J. (2014). 'The life of an OU intern – Engaging Research Final Week.' Engaging Research Blog. 18 July. Available from: http://www.open.ac.uk/blogs/per/?p=3940

Carr, J. (2014). 'The life of an OU intern – Engaging Research Week 2.' Engaging Research Blog, 8 July. Available from: http://www.open.ac.uk/blogs/per/?p=3719

Carr, J. (2014). 'Imagining scientists – having fun, out on the street, tracking criminals and fighting zombies!' Engaging Research Blog. 25 June. Available from: http://www.open.ac.uk/blogs/per/?p=3404

Clough, G., Hartnett, E., Brasher, A., Blake, C. and Adams, A. (2014). 'Evaluating ways of capturing engagement processes.' Engaging Research Blog. 16 June. Available from: http://www.open.ac.uk/blogs/per/?p=3281

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Matthews-Bird, F. (2014). 'The past is the key to the future.' Engaging Research Blog. 14 January. Available from: http://www.open.ac.uk/blogs/per/?p=1793

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Forbes, A. (2013). 'Engaging A-Level students with Postgraduate Researchers.' Engaging Research Blog. 7 October. Available from: http://www.open.ac.uk/blogs/per/?p=482

Dommett, E. (2013). 'Engaging opportunities: a research café on 'smart drugs'.' Engaging Research Blog. 3 October. Available from: http://www.open.ac.uk/blogs/per/?p=292

b) Please list any products e.g. artistic, creative or educational material outputs that have resulted from your SUPI project.

Educational Materials

We have produced a dedicated web page hosting resources relevant to school-university engagement with research.

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Grand, A. and Dommett, E. (2014). 'Open Dialogues: How to organise a research café.' 17 September. Engaging Research Blog. The Open University, Milton Keynes.
Available from: http://www.open.ac.uk/blogs/per/?page_id=6200

Whitelegg, E., Carr, J. and Holliman, R. (2014). 'Invisible Witnesses: Teaching Resource.' The Open University, Milton Keynes. Available from: http://www.open.ac.uk/invisible-witnesses/Research%20Briefing%202013.pdf

Videos

50 students from three schools and one college in Milton Keynes, researchers and support staff produced 19 short films about OU research and our SUPI. The films include contributions from students, teachers and OU researchers.

2016 **Is the Extended Project Qualification for you?**

This is a short film about the Extended Project Qualification. The film was produced by ten year 12 Denbigh School Students. The film features EPQ teacher Joe Kendall (Oakgrove School) and nine EPQ students from Oakgrove and Lord Grey Schools, respectively.

Available online: https://youtu.be/H5IQLUuyCks

2016 **Is it a bug's life on Mars?**

This is a short film about extremophiles and the parameters of life. The film was produced by ten year 12 Denbigh School Students. It features Penny Green (EPQ teacher), Warren Chinwadzimba (EPQ student) and Dr Karen Olsson-Francis (OU researcher).

Available online: https://youtu.be/jv3lnFGzJ1w

2015 **Labcasts: Interactive live web broadcasting**

This is a short film about Labcasts. It was produced by Trevor Collins, a researcher from the OU's Knowledge Media Institute.

Available from: https://youtu.be/HINfMcetNZ0

2015 **Raising the profile, and improving the quality of school-university engagement with research**

This is a spotlight interview between Lucian Hudson, OU Director of Communications, Richard Holliman (OU, SUPI Principal Investigator) and Gareth Davies, OU Research Associate for SUPI.

Available from: https://youtu.be/9jO_wr1JQuU

2014 **Rosetta: the human story**

This is a short film about the ESA-funded Rosetta Mission. The film was produced by five Walton High Students and features several OU researchers.

Available online: http://youtu.be/QxvQtI-9Zbo

2014 **Rosetta: where science meets technology**

This is a short film about the ESA-funded Rosetta Mission. The film was produced by five Walton High Students and features several OU researchers.

Available online: http://youtu.be/tGDGzzlXbbU

2014 **An APPetite for nQuire**

This is a short film about the OU's nQuire Research Project. The film was produced by five MK College students and features an OU researcher and students who have used the nQuire citizen inquiry platform.

Available online: http://youtu.be/1OI4IFPCjxw

2014 **nQuire: sound investigation**

This is a short film about the OU's nQuire Research Project. The film was produced by five MK College students and features an OU researcher and students who have used the nQuire citizen inquiry platform.

Available online: http://youtu.be/dMfwaWeM6dA

2014 **Science: white coats and laboratories**

This is a short film about the Invisible Witnesses Research Project. The film was produced by five Denbigh School Students and features OU researchers discussing research into gendered representations of scientists in popular culture.

Available online: http://youtu.be/gXBiTOUSWg0

2014 **A novel approach to the life sciences**

This is a short film about the Invisible Witnesses Research Project. The film was produced by five Denbigh School Students. The film features an OU researcher discussing research, and a teacher discussing curriculum resources, into gendered representations of scientists in popular culture.

Available online: http://youtu.be/GjblQwIoxbk

2013 **Engaging opportunities: water rocket activity**

This is a short film about the SUPI Water Rocket Competition. The film was produced by eight Denbigh School Students and features Mike Bullivant, an OU researcher. Brian White (RIP), the then Mayor of Milton Keynes is interviewed as one of the judges for the competition.

Available online: http://youtu.be/vODUANsLaKw

2014 **Open University Postgraduate Internship Programme**

This is a short film about the OU's Postgraduate Internship Programme (sponsored by Santander). The film was produced by the OU's Research, Scholarship and Quality Unit.

Available online: https://youtu.be/ToliuVqz6OU

2014 **The Open University and the Brilliant Club**

This is a short film about the OU's partnership with the Brilliant Club. The film was produced by the OU's Research, Scholarship and Quality Unit.

Available online: https://youtu.be/lH5UQYUlNrU

2013 **How to make a short film: some of the 'dos' and 'don'ts'**

This is a short film providing advice and guidance to future Media Studies students. The film was produced by five Denbigh School Students, and features several of them as interviewees.

Available online: http://youtu.be/CvEtv5faSu0

2013 **Engaging opportunities: Reflections on media training**

This is a short film reflecting on the first of our SUPI media training workshops. The film was produced by ten Denbigh School Students and features an OU researcher, teacher and several students.

Available online: http://youtu.be/0rnHFSq_G_Q

2013 **How to run a research café on 'smart drugs'**

This is a short film describing how to run a research café. The film was produced by ten Denbigh School Students and features three OU researchers and several Denbigh School students.

Available online: http://youtu.be/19m_rFAhqPM

2013 **What's it like to study at Denbigh School in Milton Keynes?**

This is a short film promoting Denbigh School. The film was produced by five Denbigh School Students and features interviews with a senior teacher and a student.

Available online: http://youtu.be/2gzYhxFgYI8

2013 **Media Training - how do you make a video?**

This is a short film exploring some of the more light-hearted aspects of producing short films. The film was produced by five Denbigh School Students.

Available online: http://youtu.be/lnZ3fGUoMkY

2013 **Media production: exploring animation and web video**

This is a short film exploring animation and web video. The film was produced by five Denbigh School Students, and features several students and OU members of staff.

Available online: http://youtu.be/ZgQ5MArkIus

5: AWARDS AND RECOGNITION

Please list any awards or recognition associated with your SUPI project (this could include either those received, or those put in place)

We have seen changes in how OU researchers are recognised and rewarded for excellence in this area, notably following the introduction of revised promotion criteria and a Knowledge Exchange Profile. We note two examples where OU staff were promoted during the course of our SUPI, one to Professor, and one to Senior Lecturer. Both members of staff used evidence of working on SUPI in their successful cases.

Four members of our SUPI (three OU researchers, one DTSA teacher) were invited to act as judges on the OU's Engaging Research Award Schemes in 2014 and 2015. One member of the OU's SUPI team, an OU researcher, has

acted as a judge on Cambridge University's 2015 Public Engagement with Research Award Scheme. The same member of the team acted as a judge on the NCCPE's Engage Competition in 2014 and 2016, on both occasions assessing entries to the school-university category.

6: COLLABORATIONS AND PARTNERSHIP

Please provide details of any significant collaborations and partnerships that have resulted from your SUPI project

The OU has been working with the Brilliant Club since 2013 to deliver training and opportunities for postgraduate researchers in classroom settings. OU researchers have also contributed to the Enigma Maths Hub, both to the Strategy Board and through activities. Further, we have contributed to the NERC-funded CENTA Doctoral Training Partnership, and members of our SUPI team are contributing to a postgraduate research supervision involving Yellow Submarine, a charity that supports young people with learning disabilities.

7: FURTHER FUNDING

Please list all further funding that your SUPI project has leveraged across its lifetime (with amounts, cash and in-kind)

2016-2017

Project Title: 'Engaging Environmental Research Workshops: Developing Productive Partnerships with End-Users'.

Funder: Natural Environment Research Council (NERC) Innovation Award; NE/L002493/1.

Overall award: £150,000 (OU awarded £50,000).

Collaborators: University of Birmingham and other partner universities through the CENTA Doctoral Training Programme.

Web: http://www.centa.org.uk

Summary: Through this award we have trained postgraduate researchers in the environmental sciences to engage end-users, including teachers and students, with contemporary research.

2016-ongoing

Project title: 1+3 MRes/PhD studentship, 'Exploring citizen science in the context of young people with special educational needs'.

Funder: OU's Open Technology Enhanced Learning Priority Research Area.

Award: £43,500.

Summary: This is a legacy project from our SUPI; see Section 8b). Holliman and Scanlon are co-supervisors, with Jane Seale, of Jessica Carr's postgraduate research.

2016

Project Title: 'Visiting Fellowship'.

Funder: Science Communicators Association of New Zealand (SCANZ).

Overall award: NZ$2,800

Collaborators: Centre for Science Communication, University of Otago, New Zealand.

Web: http://www.sciencecommunication.info

Summary: Holliman delivered the opening keynote address at the 2016 SCANZ Conference (http://www.scanz.co.nz/conference-2015); contributed to panel discussion about training for future science communicators; facilitated a culture change workshop for university leaders.

2015

Project Title: Bringing Cutting Edge Science into the Classroom.

Funder: RCUK.

Overall award: £3,150.

Collaborators: DTSA and OU.

Web: http://www.open.ac.uk/blogs/per/?p=6789

Summary: Through this award we trained a teacher and a researcher to deliver, cooperatively, a 'labcast' to A-level students at Denbigh School about the ESA-funded Rosetta Mission.

2015 Project Title: 'Neuropharmacology: from the laboratory to the clinic'.

Funder: British Pharmacological Society, Outreach Grant 2015.

Overall award: £1,305.

Collaborators: King's College London and Denbigh School, Milton Keynes.

Web: http://www.bps.ac.uk/details/educationPage/4342811/Education-grants.html

Summary: Planning and delivery of lectures and workshops in support of a competition, leading to an exhibition of student work hosted at the OU's Walton Hall campus.

2015-2106 Project title: Travel grant for attendance at the International 2016 PCST Conference, Istanbul, Turkey.

Funders: OU's School of Environment, Earth and Ecosystem Sciences.

Award: £1,150.

Role: Holliman consolidated and shared learning from our SUPI with the international field of science communication.

2015-2016 Project title: MRes studentship researching 'Engaging Children and Young People with Contemporary Science in England and Wales'.

Funder: OU's Open Technology Enhanced Learning Priority Research Area.

Award: £14,000.

Role: This postgraduate research project was designed to be a legacy project from our SUPI. Holliman and Scanlon were co-supervisors.

2014-2015 Project Title: 'Unmanned Aerial Systems (UAS) in Environmental Sciences: Engaging with End-Users'.

Funder: Natural Environment Research Council (NERC) 'Innovation Award'; NE/L002493/1.

Overall award: £136,028 (OU awarded £25,000).

Collaborators: University of Birmingham and other partner universities through the CENTA Doctoral Training Programme.

Web: http://www.centa.org.uk

Summary: Through this award we trained postgraduate researchers in the environmental sciences to engage end-users, including teachers and students, with contemporary research.

2014 Conference Travel Grant for the International Public Communication of Science and Technology Conference, Salvador, Brazil.

Funder: Santander UK Ltd.

Award: £1,550.

Web: http://www.pcst-2014.org/index.php/en

Summary: Davies consolidated and shared learning from our SUPI with the international field of science communication.

2013-ongoing Open University-Brilliant Club Partnership.

Funded by: Higher Education Innovation Funding through the Open University's annual allocation.

Award: £10,400 pa.

Summary: Postgraduate researchers receive training and experience in teaching school students.

2013-2014 Project title: 'Engaging opportunities: connecting young people with contemporary research and researchers'.

Funded by: Pro Vice-Chancellor, Research, Scholarship and Quality, The Open University.

Award: £10,500.

Web: open.ac.uk/about/teaching-and-learning/esteem/primary-links/supi

Summary: This internal funding supported the first research café (dialogue), media training workshop (creativity), and Water Rocket competition (inquiry).

8: SKILLS AND PEOPLE

a) Please list any skills related developments that have taken place as part of, or as a result of your SUPI project

Our skills-related development work has focused on the introduction of support mechanisms, professional development programmes and mentoring opportunities for academic researchers, teachers and students. As such, we have focused on three related areas identified by the NCCPE through their work with the Beacons for Public Engagement: Training, Support and Recognition (NCCPE, 2010), where relevant linking this with the Public Engagement Lens on the Research Development Framework.

Figure 16: Supporting NERC-funded postgraduate researchers through the CENTA Doctoral Training Partnership. Photo: Gareth Davies.

Upstream planning: Our training activities have focussed mainly in the form of planning for school-university engagement with research, with support offered in the planning for Pathways to Impact and other relevant funding opportunities (Figure 16). The learning from this work has been consolidated and shared in a number of forms, e.g. see Holliman and Warren, 2015; also Sections 2a and 4b.

Sourcing credible information: How do children and young people search for, filter, analyse and respond to diverse sources of information in structured ways? Through our work on the Extended Project Qualification we have helped to support the development of information literacy skills for students and teachers (see Sections 2c and 4b).

Representing research: We have supported students, teachers and OU researchers as they take on media literacy skills in collecting, collating and reconstructing information for a range of different audiences (see Sections 2c and 4b). Further, members of our SUPI (teachers and researchers) have supported OU researchers through constructive criticism as they prepare for the annual STEM Lectures.

Project management and team working: We have supported OU researchers wishing to gain practical experience in the design and delivery of school-university engagement activities as part of a larger team (see Section 8b for examples). Further, although this wasn't put into action, we worked with KS5 students through our Open Dialogue programme to support the planning of research cafés.

Teaching: OU postgraduate researchers have few opportunities to gain skills in face-to-face teaching during the course of their studies. In working with the Brilliant Club these researchers have been trained deliver teaching in classroom settings.

Strategic planning: Members of our SUPI have mentored OU researchers as they develop strategic approaches to school-university engagement with research. This work is ongoing.

Career development and progression: We have offered training and mentored OU researchers to ensure that they collate information about their school-university work, recording, where relevant, skills and competencies gained in the process (e.g. see Holliman and Warren, 2015). Members of our SUPI also routinely mentor candidates for promotion and provide reviews and references for job applications and career progression.

b) Please list any secondments placements and internships to or from other organisations associated with your SUPI project

In Year 2 we mentored Leanne Gunn, at the time a postgraduate research student at the OU, to help support the preparation and delivery of the Water Rocket Activity (Gunn, 2014). Leanne had expressed a desire to move to become a professional science communicator, and was looking for project management experience. Leanne now works for Science Made Simple (SMS) and recently opened a branch of SMS based at the OU's campus in Milton Keynes.

In Year 2 we employed Jessica Carr as an intern to support three Media Training workshops and to deliver the Water Rocket Activity (Carr, 2014). Jessica subsequently went on to work for Yellow Submarine, a charity dedicated to supporting young people with learning difficulties to develop their social skills, confidence, independence and ultimately their employability. Jessica is now studying for a higher research degree at the OU, where she is investigating how people with learning disabilities engage with citizen science initiatives.

Mairi Walker and Vincent Trott, both OU postgraduate researchers at the time, worked as Santander-sponsored interns at the Brilliant Club, an educational charity (Walker and Trott, 2014). The students helped to organise placements for other PGRs in schools. Mairi is currently working as a Mathematics Engagement Officer at the University of Edinburgh.

9: OTHER

Please state here any other information associated with your SUPI project that you would like RCUK to know as part of final reporting.

We have worked with a wide range of OU researchers, teachers and students from schools in Milton Keynes, other SUPIs in the RCUK-funded network, and supporting staff from a range of organisations over the four years of our partnership.

Listed in alphabetical order the following people (students, teachers, OU researchers and other professionals) have supported our work.

Significant contributors

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National Coordinating Centre for Public Engagement

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RCUK Public Engagement with Research Team

The Public Engagement with Research Unit at RCUK has shown a willingness to engage with difficult challenges to improve the culture of school-university engagement with research. Jenni Chambers, Saffron Townsend and Ruth Williams, but also Peter Tomiak-Baquero, Claudine Anderson and Lewis Dean, have helped us to drive this agenda forwards.