

# Research-engaged learning at Russell Group universities

## 1. Summary

- 1.1 **Russell Group universities are world leaders in pioneering research and are equally committed to delivering an excellent education and student experience which offers lasting benefits to our graduates - and society as a whole.**
- 1.2 Research-engaged learning is an approach which is fully embedded across Russell Group institutions and throughout disciplines and faculties. Students at our universities are actively engaged in, and with, research from day one, providing them with the opportunity to develop a broad range of skills which are critical to their future success in a rapidly changing world.
- 1.3 Key characteristics of the research-engaged learning environment at our universities include:
  - **Research forms a fundamental component of course content and (co)-curricula options.** Active researchers, who are often leaders in their field, design curricula ensuring students benefit from the very latest knowledge and thinking in their discipline and beyond.
  - **Students are supported to develop critical skills which equip them to be lifelong learners,** able to take on a range of demanding roles in the workplace. Students undertake research and inquiry throughout their time at university, improving their learning experience and enabling them to become researchers in their own right and to develop analytical skills fundamental to success in their future careers.
  - **Students' own research can also make a key contribution to advancing knowledge,** further enriching the research and teaching environment.
  - **Access to world-leading research facilities and equipment underpin excellent learning experiences for students.**
  - **Research findings at our universities inform the creation of new pedagogical approaches** within the institution and can be applied more broadly on a national and international level.
- 1.4 Learning grounded in a culture of research and inquiry enables students to become active participants in the production of knowledge rather than passive recipients. Russell Group universities expect students to engage critically with their subject throughout their studies and providing opportunities to undertake and interact with research is a fundamental element of this.
- 1.5 While many courses require students to undertake a dissertation in their final year of study, students at Russell Group universities benefit from a research-engaged learning environment from the outset of their degree and throughout their time at university. This approach provides a **wide array of benefits for students**, including enabling them to develop the skills they need for a wide range of careers including: critical thinking, the ability to solve complex problems, and ethical awareness. This means students develop the personal and professional skills that are integral to graduate-level jobs and are able to adapt well to changing labour market demands and future challenges.

## 2. Features and benefits of a research-engaged learning environment

*A cutting-edge curriculum informed by the latest research*

- 2.1 **World-leading research feeds directly into taught courses at Russell Group universities at undergraduate and postgraduate level and ensures students benefit from the very latest knowledge and thinking in their subject discipline and beyond.** Active researchers lead on the design of curricula ensuring students learn about the intellectual underpinnings of their subject, its structure, impact and diversity, following a route through knowledge that has been mapped by those who understand it most deeply and are extending its boundaries. Curricula and broader co-curricular experiences are designed to enable students not only to learn about research, but to undertake their own research and inquiry within and across disciplines. This involves enabling students to become producers of research and to communicate their findings to others within their institution and more broadly.
- 2.2 The breadth of research expertise which our universities have nurtured over the years means they can offer a wide range of specialist undergraduate and postgraduate courses which draw on the strengths of leading academics across an array of disciplines. As well as the opportunities which students at Russell Group universities have to engage with some of the latest thinking in their subject, they also interact with members of staff who have pioneered the research in their field and learn from their first-hand experience what it is like to design and carry out their own research. This focus on the development of research and inquiry skills enables students to begin framing their own questions, evaluating and assessing data and so supports them to become better learners throughout their degree.
- 2.3 **In some disciplines, a close relationship between researchers and leading professionals also provides students with privileged access to the very latest practice.** For example, medical and dental students at Russell Group universities are able to gain experience of research at the academic–clinical interface through teaching in university hospitals, with first-hand exposure to the application of research in a clinical setting. This also delivers direct experience of innovation in research and application, and of how knowledge is exchanged between universities, researchers and other stakeholders.

*Developing students as active researchers and creating a pipeline of highly skilled graduates*

- 2.4 **Russell Group universities encourage students to be active participants in their learning.** Dissertations and final-year projects are the most well-known examples of research-led learning and provide an effective means of research training, helping students to develop advanced skills such as critical evaluation, analysis and project management. However, students learn about how knowledge is created and are taught to explore the knowledge base in their discipline and beyond across the entirety of their courses. From day one, students are taught to set and test their own hypotheses, and to make decisions based on the best-available evidence. They can then start formulating and following through their own lines of inquiry, under supervision from academics, and participate in the creation of knowledge.
- 2.5 Our universities offer a wide range of other opportunities for students themselves to become involved in researching subject material and even leading research projects. This includes offering vacation research placements, student conferences and opportunities to publish in dedicated undergraduate journals. For example, Imperial College London and the University of Cambridge both offer undergraduate students across disciplines the opportunity to engage in internationally leading research activities through summer placements, enabling them to become fully participating members of a research team. In 2015 more than 300 undergraduate students at Imperial took part.

- 2.6 These opportunities to become directly involved in research enhance students' ability to develop key employability skills, providing them with a competitive edge over their peers upon graduation. Research-engaged learning also supports the development of skills which are fundamental to successful entrepreneurship including research and development, decision-making as well as the ability to be creative and innovative.
- 2.7 **Undergraduate research opportunities can also encourage progression to further study.** Research by the Higher Education Policy Institute has shown that first-degree graduates from research-intensive universities are more likely to progress directly to postgraduate study and, in particular, to postgraduate research study which is in itself a requirement for many demanding careers.

#### *Access to world-class infrastructure and equipment*

- 2.8 **Russell Group universities provide outstanding facilities ranging from science laboratories to world-class libraries and digital resources.**<sup>1</sup> Access to leading research facilities can support learning, providing opportunities for students to test the theory they have learnt in the classroom in a practical setting, supported and supervised by active researchers.

#### *Applying research findings to inform pedagogical approaches*

- 2.9 When it comes to excellence in teaching, our universities actively seek out new, advanced ways to enhance the student learning experience. Teaching within Russell Group universities is widely informed by research into the learning process itself. Projects have emerged from the practice of individual academic staff, and our universities have dedicated internal funding streams to support innovation. For example, the Teaching Innovation Grants awarded at the University of Bristol support a culture of investigation, experimentation and innovative practice within education at the University. Similarly, the University of Cambridge has a Teaching and Learning Innovation Fund (TLIF) which awards £100,000 each year to innovative pedagogical projects.

### **3. Illustrative examples of approaches to research-engaged learning at Russell Group universities**

#### **Ensuring all UCL students learn through active participation in research and inquiry**

University College London (UCL) is implementing an institution-wide initiative, '*Connected Curriculum*', which aims to ensure that all UCL students are able to learn through participating in research and inquiry at all levels of their programme of study. The *Connected Curriculum* encourages students to work alongside the University's world-class researchers and to produce work that they can present to the public. For example, undergraduate students at UCL assisted an AHRC-funded research project at the UCL Petrie Museum of Egyptian Archaeology using the museum's collections to examine the history and politics of the excavated material found between 1880 and 1980. These undergraduate internships provided the opportunity for students to undertake their own research working with UCL collections.

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<sup>1</sup> Over a five-year period to 2017, Russell Group universities will invest £768m in teaching and research facilities for science, technology, engineering and maths (STEM) subjects, £162m in teaching facilities for non-STEM subjects, and £172m in library facilities.

## **Interdisciplinary research groups enable students to tackle global challenges at the University of Exeter and the University of Edinburgh**

At the University of Exeter, all first year undergraduates are encouraged to participate in the *Grand Challenges programme*. This provides an opportunity for students to work in interdisciplinary research groups with access to the university's top academics along with world-leading experts to produce solutions and ideas to address some of the key dilemmas of the 21st century. For example, in 2016, students were immersed in a week long programme of activities including lectures and workshops with experts including visitors from the NHS, Samaritans and mental health professionals, to explore possible initiatives to reverse the burden of mental ill-health.

At the University of Edinburgh, "*Our changing world*" is an interdisciplinary first-year course aimed at raising awareness of how research and scholarship meet global challenges. Students are expected to address key global issues across disciplinary boundaries and develop an understanding of the relevance and impact of their own subject in the broader context. Students on the course attend a series of public lectures, research the topics in depth, participate in facilitated group discussions on each topic, work in small groups to produce a collaborative project on a chosen topic, and produce an individual research report.

## **Providing opportunities for medical, dental and veterinary students to undertake research across Russell Group universities**

A number of Russell Group universities offer medical, veterinary and dental undergraduates opportunities to engage with active researchers and undertake their own research through the INSPIRE scheme, a national initiative coordinated by the Academy of Medical Sciences and supported by the Wellcome Trust. At the University of Bristol, for example, research opportunities are developed through consultation with current students, and with matched funding from the Faculty of Health Sciences, the Faculty of Biomedical Sciences and the Elizabeth Blackwell Institute. Bristol works in close partnership to deliver co-ordinated activities with others including the Universities of Cardiff and Exeter. Opportunities to engage with, and undertake, research are built in from induction week supporting students to develop research skills which are vital for all clinicians, not just those with an interest in pursuing a career in academic medicine.

## **Enhancing the student experience for Pharmacy students at the University of Nottingham**

A new initiative at the University of Nottingham's School of Pharmacy brings together undergraduate and postgraduate student communities to increase students' awareness of, and exposure to, the research carried out within the School. Through a series of events and shadowing opportunities and the creation of new visually-rich interactive materials, undergraduate pharmacy students will have the opportunity to engage with pharmaceutical sciences research. In turn, postgraduate students will gain skills in science communication and teaching as part of their training portfolio. This reciprocally beneficial initiative will widen the horizons of the UG and PG students in the School, diversifying their skills and enhancing their employability.

## **Contributing towards fresh thinking in teaching at the University of Cambridge**

The PGCE programme at Cambridge University draws together professional practice through close partnerships with schools and research undertaken at the University's Faculty of Education in order to develop new teachers whose practice is informed by research. Students have opportunities to attend research seminars on issues such as adolescence and wellbeing, and to produce research which is written up in journals (such as the Faculty's open-access Journal of Trainee Teacher Educational Research (JoTTER)) and presented at academic conferences. External Examiners' comments on the PGCE frequently praise the extent to which trainees on the programme are able

to develop into autonomous and thoughtful teachers able to question the process of teaching and learning and to begin to understand the complex environment within which they work.

### **Research opportunities enable students to develop analytical skills and contribute to the continuous improvement of the student experience at King's College London**

At King's College London, student "interns" are recruited from across the university during the summer months to work on research projects within the King's Learning Institute. The research conducted at the Institute is focused on two major and complementary themes: academic identity and role; and students' learning. King's students lead on institutional enhancements through the internships, researching the student experience and proposing student-led improvements. Projects have included: the BME attainment gap; co-curricular design and award schemes; student-led timetabling; assessment and feedback; diversifying the curriculum; and priorities for supporting students with disabilities. Student-led recommendations have led to new support posts; new policies on students' access to Estates and libraries; the revision of reading lists; the development of study skills centres, and the design of surveys, evaluation and feedback.

### **Providing undergraduate students with real-world consultancy experience at the London Schools of Economics and Political Science**

London School of Economics (LSE) Development Management students get real-world consultancy experience with external clients through a module which pairs them with partners seeking research support in areas where their interests coincide. Under the supervision of academics, students produce a consultancy report based on their own independent research and present their findings. The module provides students with vital experience of working with clients and producing high quality analysis to tight deadlines. The skills that students develop are highly transferable, with graduates regularly going on to secure consultancy and staff roles with the UN and other high-profile organisations. Development Management alumni Meirzhan Yussupov said: *"This exciting teamwork exercise allowed us to exchange our ideas and showed how classroom theory was linked to real-life practice. Skills I learned during the programme have proved extremely useful for my career."*

### **Opportunity to work on research projects at CERN led to lead author papers for physics students at the University of Southampton**

At the University of Southampton, fourth year physics students are encouraged to spend a year working with academics on an advanced research project either at Southampton, the Harvard Smithsonian, or CERN, which provides research for their Masters' thesis. While academic oversight remains with their Southampton advisor, students are provided with day-to-day scientific direction from their hosts at Harvard or CERN, with whom they share office or lab space. Some of the projects students have worked on have explored the connection between Dark Matter Halos and Supermassive Black Holes and measured particle acceleration. A number of these projects have resulted in lead author papers for Southampton students.

### **Promoting student participation in research on Global Change Biology at QMUL**

Global Change Biology is a second year module at Queen Mary University of London which involves students in carrying out original research on environmental warming. Laboratory classes provide students with an overview of the scientific process and help them to develop the skills to undertake their own research, working through hypothesis testing and experimental design, carrying out an original experiment, using basic statistics to analyse the data collected, writing up the experiment in the form of a scientific paper, peer review, and eventual "publication" and oral presentation of the research. Over a period of three years different cohorts of students are contributing to ongoing experiments designed to explore the impact of environmental warming.

Each year students pass on their work to their successors so that they can build on the data and emerging hypotheses. The aim is to publish a multi-authored original research article. Student satisfaction and performance has improved on the course following the introduction of this module.<sup>2</sup>

### **Assisting undergraduate students to develop and publish their own research through a peer-reviewed journal at the University of Warwick**

The Institute for Advanced Teaching and Learning (IATL) at the University of Warwick is home to "*Reinvention: an International Journal of Undergraduate Research*", which gives students a chance to see their research published while they are studying. *Reinvention* is an online, peer-reviewed journal, dedicated to the publication of high-quality undergraduate research and encourages students to become active members of the research community. The journal has published over 100 undergraduate research papers from around the world.

### **Opportunities to learn alongside active researchers at world-leading nuclear research Institute at the University of Manchester**

With over 300 academic researchers, including internationally renowned experts, and more than 1,000 undergraduates taking nuclear modules, the University of Manchester's Dalton Nuclear Institute is the UK's largest concentration of high-level nuclear R&D and skills development. The Institute offers opportunities for students studying a range of science and engineering disciplines to choose nuclear-related modules or to undertake nuclear project work as part of their undergraduate syllabus. Students have the opportunity to tackle genuine research challenges and be part of the research community at the Institute. In addition, the Institute's industry focus (including a strategic partnership with AMEC) helps to prepare undergraduate students for careers in the nuclear industry or to pursue postgraduate studies or research in the nuclear field.

### **Tackling industrial problems by undertaking research and applying its findings at the University of Liverpool**

Mechanical Engineering students at the University of Liverpool undertake "Capstone" projects working in groups to integrate research into the design, build and test of new products and solutions to problems. Students deploy their scientific learning and design skills in order to fully research and understand a live industrial problem. One project considered how to reduce the plant electricity bill at Jaguar Land Rover. Students collaborated with practising engineers, academics and technicians at JLR and on campus to explore potential areas for energy saving, presented their concept to senior engineers, designed, built and tested a prototype, and made recommendations for industrial implementation. The skills students learn through the projects help them to transform into fledgling professional engineers and so improve their graduate employability.

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<sup>2</sup> More details are available here: <http://qudoublehelixjournal.org/index.php/dh/article/view/39/153>