

Benefits of the research-intensive learning environment at Russell Group universities

1. Summary

In order to deliver the Government's modern industrial strategy, a pool of high-level graduate skills is needed to feed into leading edge sectors and help drive innovation and productivity. These talented individuals need to be able to think critically, analyse and solve complex problems, and bring ideas and teams together – and crucially, they need to have the capability to adapt to a rapidly changing labour market.

The research-intensive learning environment at Russell Group universities enables students to become active participants in the production of knowledge rather than passive recipients. Students are supported to develop the personal and professional skills that are integral to graduate-level jobs, meaning they are better able to realise their ambitions and to contribute fully to our society and economy.

Key characteristics of this research-intensive learning environment are as follows:

- **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 benefit from being part of a community comprising world-leading researchers across disciplines,** and 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 future careers.
- **Students' own research can also make a key contribution to advancing knowledge** and further enriching the research and teaching environment. Research benefits from researchers' involvement in teaching and from student participation in investigation.
- **Access to world-leading research facilities and equipment** underpins excellent learning experiences for students.
- **Research findings at our universities inform the creation of innovative new pedagogical approaches** within the institution and can be applied nationally and internationally.

Russell Group universities support 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.

While many courses require students to undertake a dissertation in their final year of study, **students at Russell Group universities benefit from a research-intensive learning environment from the outset of their degree and throughout their time at university.**

2. A cutting-edge curriculum informed by the latest research

World-leading research feeds directly into taught courses at Russell Group universities at undergraduate and postgraduate level ensuring 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 learn how to undertake their own research and inquiry within and across disciplines. 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.

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. Connected Curriculum encourages students to work alongside the University's world-class researchers and to produce work that they can present to the public.

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. Over a period of three years different cohorts of students are contributing to ongoing experiments designed to explore the impact of environmental warming. Student satisfaction and performance has improved on the course following the introduction of the module.

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 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.

Being part of a community of world-leading research staff is a critical facet of the student experience at Russell Group universities. At Kings' College London, for example, all academic staff, including those on research contracts and in senior leadership positions are required to teach, and the creation of an education-led route through to professorial level in the promotions scheme for academic staff demonstrates the College's commitment to valuing teaching. This is the case at a number of our universities.

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.

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 autonomous and thoughtful 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) and presented at academic conferences.

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 identify areas for energy savings and make recommendations for industrial implementation.

Since 2010, the School of Chemistry at the **University of Nottingham** has run an innovative series of modules in years three and four that aim to prepare 'industry-ready graduates' for careers in the chemicals industry. The modules which have been co-created and delivered in collaboration with GSK develop the concepts and practical skills that underpin drug discovery. To date, over 170 students have undertaken these modules, contributing to two collaborative respiratory medicine research programmes. The molecules discovered have been screened at GSK for efficacy and several are being investigated further as they show potent medicinal activity comparable to drugs already available.

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

Russell Group universities encourage students to be active participants in their learning. 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.

As well as embedding research into the design of curricula, our universities offer a wide range of opportunities for students to become involved in researching subject material and even leading research projects through vacation research placements, student conferences and opportunities to publish in dedicated undergraduate journals.

Imperial College London offers 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 in their programme. Similarly, the Research Scholarships Scheme at **Newcastle University** gives undergraduate students the opportunity to work with academic staff for six to eight weeks over the summer vacation, on research projects that the students have defined and developed. Over 80 Scholarships are awarded each year and students have the opportunity to present the results of their project at an annual Celebrating Student Research Scholarships event.

The Institute for Advanced Teaching and Learning (IATL) at the **University of Warwick** is home to an online, peer-reviewed journal "Reinvention" which is 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.

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. Students have worked on projects exploring 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.

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 interested in pursuing a career in academic medicine.

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. Of those in employment six months after graduating, 80% of leavers with a first degree from a Russell Group university were in professional employment compared to 68% for other universities. Research-intensive learning also supports the development of skills which are fundamental to successful entrepreneurship including research and development, decision-making and the ability to be creative and innovative.

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. Recent data collection at the University of Exeter has revealed that, since 2014, undergraduate and taught postgraduate students have been involved as co-authors in more than 100 papers published in peer-reviewed mainstream journals.

4. Access to world-class infrastructure and equipment

Russell Group universities provide outstanding facilities ranging from science laboratories to world-class libraries and digital resources.¹ 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.

*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.*

5. Applying research findings to inform pedagogical approaches

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, and the **Universities of Birmingham and Nottingham** have established a partnership fund of £250,000 to support joint educational enhancement projects and encourage the sharing of best practice.*

*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 students research the student experience and propose student-led improvements. Projects have included: addressing 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.*

*The **University of Exeter** runs an innovative, 'Students as Change Agents' programme which supports students in developing and leading research projects designed to effect change in their programmes and explore the impact of their learning. Over the last eight years, several hundred SACA projects have been undertaken, realising interventions including: student-run careers and module fairs; a buddy scheme for year-abroad students; resources for mental health and support for international students; and improved delivery of seminar teaching.*

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To note, all case studies are provided for illustrative purposes only and do not represent a comprehensive overview of the research-intensive learning environment at Russell Group universities.

¹ Over a five-year period to 2017, Russell Group universities are investing £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.