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Preserving the DNA of UK universities: the key role of non-UK postgraduate research students

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▪ Introduction

We cannot understand the risks posed by Brexit to the UK higher education (HE) system simply by taking a bird's eye view of the system at the macro-level, treating the 'university' as a one and indivisible unit and the 'student' as a one-size-fits-all category.

This misses the diversity of higher education institutions (HEIs), the multitude of disciplines they harbour that cater for all dimensions of human activity and the different types of students they enrol.

We offer a more fine-grained analysis, focusing on one dimension of higher education and research with many ramifications. That is the role of non-UK postgraduate research students in UK research. These students substantially enhance UK research capacity and teaching excellence and UK HEIs are highly dependent on them.

▪ The UK higher education system as a kaleidoscope of HEIs

Not all HEIs are equally affected by Brexit, or affected in the same ways. Even within membership groups, such as the Russell Group, MillionPlus, the United Kingdom Arts and Design Institutions Association (ukadia) or University Alliance, each university is different. Each has a distinctive mission and set of core activities, based on the disciplinary mix which defines its course offering, research capacity and intensity, wealth, size, location, selectivity, target audience and its regional, national and/or international engagement. Some universities are located in global cities, others are rural and depend on a narrowly defined regional intake. Some are multi-billion operating institutions that can cushion a sudden hit.

For example, Imperial College London is a research oriented, science-focused institution. The Open University focuses predominantly on teaching and excels in distance learning opportunities. Birkbeck University specialises in evening higher education. This diversity has crucial implications in terms of the ability to win substantial EU research funding, or capacity to attract non-UK EU students or secure European structural funds based on the characteristics of the region. Thus, this mix of characteristics also affects vulnerability to a hard Brexit.

Sector-wide analyses of the effects of Brexit can be misleading, as high performing institutions, and even certain disciplines within institutions, pull the metrics up. Increasing competition for resources (students, staff, research funding etc) risks making the situation harder for some universities that already struggle filling places, attracting international staff or securing research grants. With fewer pots of research funding and further concentration of funding opportunities, competition for national research funding can be expected to become fiercer, and reinforce disparities in research power between UK HEIs, with the established hierarchy of institutions already securing the lion's share of national funding and maintaining their position.

- **The reproduction of the academic class: preserving the UK's research eco-system**

The UK research eco-system relies on postgraduate research student numbers for its continuity and survival. Research intensive and research-led HEIs depend on them as a funded talent pool that builds the capacity of postgraduate research programmes, ensuring their quality and their world-class status.

Postgraduate research students also often teach in their universities and publish and co-publish with academic staff. The interface between teaching and research is a key component of the Humboldtian tradition of European universities, where excellent teaching is infused by innovative research. Many postgraduate research students are also part of the future generation of UK academics. Anything that diminishes their numbers or prevents them from pursuing the same research opportunities as before Brexit is likely to fundamentally damage the future of UK universities as international renowned global beacons of excellence. Postgraduate research students are the DNA of university enterprise.

Because UK universities have been open to talent from all over the world and pick the best people, non-UK student numbers and ratios are exceptionally high at postgraduate research level. Non-UK EU nationals are 13.3 per cent of those enrolled in postgraduate research programmes, while non-EU international students are 28.8 per cent. Ratios of non-UK EU students vary, depending on the subject area, the mission and the profile of a HEI.

- **STEM subjects at risk**

STEM subjects (defined by HESA as the physical sciences, engineering, technology, computer science and mathematics), crucial engines of the Industrial Strategy, are particularly at risk. Non-UK students account for 51.5 per cent of the 34,685 postgraduate research students in these strategic subjects, including 51.9 per cent in mathematics, 58.2 per cent in computer science and 59.1 per cent in engineering. For example, in mathematics 22.1 per cent of postgraduate research students are non-UK EU students, while another 29.8 per cent are non-UK, non-EU students (HESA, 2016-17). The Industrial Strategy relies heavily on technological transfer and other university research outputs in the STEM areas. The STEM disciplines, including computing and engineering, also have national security implications. The home supply of postgraduate STEM talent is insufficient and the non-UK numbers are vital.

Table 1. Proportion of postgraduate research students who are from non-UK EU and EU countries, all UK institutions, by broad field of study: 2016-2017

	UK PGR students	non-UK EU students	non-EU students	All PGR students	non-UK EU students %	non-EU students %
Science subject areas						
Physical sciences	7610	2205	2935	12,750	17.3	23.0
Mathematics	1400	645	870	2915	22.1	29.8
Computer science	2035	775	2060	4870	15.9	42.3
Engineering Technology	5785	2210	6155	14,150	15.6	43.5
Architecture Building PI	840	225	885	1950	11.5	45.4
Medicine Dentistry	5760	910	1825	8495	10.7	21.5
Medicine allied subject	5500	935	1945	8380	11.2	23.2
Biological Sciences	10,665	1965	2600	15,230	12.9	17.1
Veterinary Sciences	215	45	45	305	14.8	14.8
Agricultural Sciences	465	95	325	885	10.7	36.7
All science subjects	40,275	10,015	19,635	69,925	14.3	28.1
All non-science subject areas						
Social studies	4880	1365	2810	9055	15.1	31.0
Law	1090	310	845	2245	13.8	37.6
Business and related	2765	725	3180	6670	10.9	47.7
Mass Communications	730	120	355	1205	10.0	29.5
Languages	3235	775	1700	5710	13.6	29.8
History Philosophy	4835	830	1765	7435	11.2	23.7
Creative Arts Design	2905	455	730	4090	11.1	17.8
Education	4395	390	1395	6180	6.3	22.6
Combined studies	10	0	0	15	0.0	0.0
All non-science subjects	24,850	4970	12,775	42,595	11.7	30.0
Combined total						
All subject areas	65,125	14,985	32,410	112,520	13.3	28.8

Combined total includes 5 students with subject unknown. Some tables do not total correctly in the source. This appears to be due to the use of a method of rounding to the nearest unit of 5 in all data.

Source: <https://www.hesa.ac.uk/data-and-analysis/students/what-study>

▪ **Postgraduate research students at UK universities: where are they?**

In 2016-17 (HESA), there were 85 non-UK EU postgraduate research students at ukadia universities, 440 at all MillionPlus universities, 775 in the University Alliance universities, and a large 9,615 at Russell Group universities. Another 4,065 were enrolled at the non-affiliated universities. Out of a total of 14,985 non-UK EU postgraduate research students, 64.2 per cent are enrolled at Russell Group universities, 5.2 per cent in the University Alliance, 2.9 per cent at MillionPlus universities and 0.6 per cent at ukadia universities.

The mission and research focus of an institution has direct repercussions on the number of postgraduate research students at a particular HEI. For example, in 2016-17, Birkbeck University had 85 postgraduate research non-UK EU students out of a total of 755 (full-person equivalent), the Open University had none out of a total of 550, while Imperial had 855 out of a total of 4,140 (HESA). The most prestigious UK universities, which also tend to be the most research intensive universities, have high numbers of postgraduate research students – and hence high numbers of non-UK EU and non-EU research students.

In nine universities (LSE, Cranfield, St Andrews, Oxford, Edinburgh, Cambridge, Queen Mary, Imperial and Loughborough) *more than half of all postgraduate research students were international*. In another 18 institutions the ratio was over 40 per cent. Overall, in 36 UK HEIs, over a third of students at postgraduate research level were non-UK, signifying on the one hand the great attractiveness of the sector to the outside world, but also its potential vulnerability in a hard Brexit. Table 2 shows that the 10 universities with the largest numbers of postgraduate research students are all Russell Group institutions. Table 3 confirms previous findings with regard to the distribution of non-UK EU students that tend to concentrate around Oxbridge, the London Russell Group universities and Scottish universities.

Table 2. HEIs with the highest numbers of postgraduate research students, HESA, 2016-17

	Total number of PGR research students	EU PGR research students	Non-EU PGR research students	EU PGR research %	Non-EU PGR research %
1. UCL	5,715	900	1,395	15.7	24.4
2. Cambridge	5,305	1,085	1,730	20.5	32.6
3. Oxford	5,080	1,045	1,740	20.6	34.3
4. Imperial	4,140	855	1,245	20.7	30.1
5. Manchester	3,625	445	1,300	12.3	35.9
6. Edinburgh	3,370	715	1,090	21.2	32.3
7. Nottingham	2,945	410	965	13.9	32.8
8. Birmingham	2,635	320	725	12.1	27.5
9. Sheffield	2,585	325	945	12.6	36.6
10. Southampton	2,460	325	805	13.2	32.7

Table 3. HEIs (with >5,000 students) with the highest percentages of EU postgraduate research students (HESA, 2016-17)

	EU PGR research students %	EU PGR research students
1. LSE	29.3	145
2. Heriot-Watt	21.3	170
3. Edinburgh	21.2	715
4. Imperial	20.7	855
5. Oxford	20.6	1,045
6. Cambridge	20.5	1,085
7. St Andrews	20.4	185
8. Goldsmiths College	17.7	70
9. Loughborough	17.5	180
10. Queen Margaret University, Edinburgh	17.4	20

A full table of non-UK postgraduate researchers in UK, with data for every individual HEI, is provided below.

Table 4. Postgraduate research students from non-UK EU and non-EU countries, all individual UK institutions: 2016-2017

	UK PGR students	non-UK EU students	non-EU students	All PGR students	non-UK EU students %	non-EU students %
Oxford and Cambridge						
U Cambridge	2485	1085	1730	5305	20.5	32.6
U Oxford	2295	1045	1740	5080	20.6	34.3
Other Russell Group institutions						
U College London	3420	900	1395	5715	15.7	24.4
Imperial College	2040	855	1245	4140	20.7	30.1
U Manchester	1885	445	1300	3625	12.3	35.9
U Edinburgh	1565	715	1090	3370	21.2	32.3
U Nottingham	1570	410	965	2945	13.9	32.8
U Birmingham	1585	320	725	2635	12.1	27.5
U Sheffield	1315	325	945	2585	12.6	36.6
U Leeds	1430	275	790	2495	11.0	31.7
U Southampton	1335	325	805	2460	13.2	32.7
King's College London	1470	400	545	2415	16.6	22.6
U Glasgow	1325	315	655	2300	13.7	28.5
U Bristol	1385	215	465	2060	10.4	22.6
Newcastle U	1210	165	685	2060	8.0	33.3
U Liverpool	1190	225	620	2040	11.0	30.4
Cardiff U	1205	225	430	1855	12.1	23.2

Queen's U Belfast	1115	255	395	1765	14.4	22.4
U Warwick	1030	285	495	1675	17.0	29.6
U Exeter	945	160	385	1490	10.7	25.8
U Durham	765	175	540	1480	11.8	36.5
U York	815	145	480	1445	10.0	33.2
Queen Mary U London	600	195	430	1225	15.9	35.1
London School Economics	140	145	210	495	29.3	42.4
Other higher education institutions						
U Strathclyde	1030	225	425	1680	13.4	25.3
U Lancaster	885	160	420	1465	10.9	28.7
U Leicester	705	125	480	1305	9.6	36.8
U Bath	665	185	380	1230	15.0	30.9
U Aberdeen	515	165	465	1145	14.5	40.6
U Kent	675	170	295	1135	15.0	26.0
U Reading	575	115	405	1095	10.5	37.0
Middlesex U	620	110	350	1080	10.2	32.4
U Huddersfield	735	60	280	1070	5.6	26.2
Loughborough U	510	180	340	1030	17.5	33.0
U Surrey	635	155	230	1015	15.3	22.7
U East Anglia	635	130	220	985	13.2	22.3
U Sussex	520	165	275	960	17.2	28.6
U St Andrews	410	185	315	905	20.4	34.8
Swansea U	600	110	195	905	12.2	21.5
Cranfield U	340	175	330	840	20.8	39.3
Heriot-Watt U	325	170	305	800	21.3	38.1
U Hull	455	55	255	765	7.2	33.3
Birkbeck College	550	85	125	755	11.3	16.6
Nottingham Trent U	445	50	215	710	7.0	30.3
Manchester Metropolitan U	560	45	90	695	6.5	12.9
U Central Lancashire	520	50	115	680	7.4	16.9
U Essex	345	100	205	655	15.3	31.3
Anglia Ruskin U	390	55	205	650	8.5	31.5
Royal Holloway and Bedford	445	75	120	640	11.7	18.8
U Northumbria	425	55	145	625	8.8	23.2
U Portsmouth	415	45	160	625	7.2	25.6
U Plymouth	395	80	145	620	12.9	23.4
U Salford	310	40	270	615	6.5	43.9
U Dundee	315	85	190	590	14.4	32.2
Liverpool John Moores U	375	55	145	575	9.6	25.2
Canterbury Christ Church U	515	15	35	570	2.6	6.1
Bangor U	355	40	175	565	7.1	31.0
U Stirling	375	60	130	565	10.6	23.0
Coventry U	325	65	150	540	12.0	27.8
Bournemouth U	325	55	155	535	10.3	29.0
U Ulster	370	80	85	535	15.0	15.9
Brunel U London	235	45	250	530	8.5	47.2
City U London	295	90	135	520	17.3	26.0
The Open University	495	0	5	505	0.0	1.0

Sheffield Hallam U	355	55	95	505	10.9	18.8
Leeds Beckett U	440	15	50	500	3.0	10.0
U Hertfordshire	370	35	85	490	7.1	17.3
U West of England, Bristol	300	45	130	475	9.5	27.4
De Montfort U	270	55	145	470	11.7	30.9
SOAS U London	190	75	205	470	16.0	43.6
Birmingham City U	350	20	90	465	4.3	19.4
Kingston U	300	40	100	445	9.0	22.5
U West of Scotland	285	35	120	440	8.0	27.3
Glasgow Caledonian U	240	45	150	435	10.3	34.5
London School of Hygiene TM	205	30	200	435	6.9	46.0
U Brighton	275	50	110	430	11.6	25.6
U Greenwich	250	35	145	430	8.1	33.7
U Chester	360	15	45	420	3.6	10.7
U East London	300	30	85	415	7.2	20.5
Keele U	285	30	100	410	7.3	24.4
U Lincoln	285	30	95	405	7.4	23.5
Goldsmiths College	235	70	95	395	17.7	24.1
Oxford Brookes U	230	60	95	385	15.6	24.7
U Wolverhampton	175	20	140	335	6.0	41.8
Aston U	190	45	100	330	13.6	30.3
Aberystwyth U	215	35	75	325	10.8	23.1
U South Wales	235	40	40	310	12.9	12.9
U Bradford	150	15	130	295	5.1	44.1
Roehampton U	195	35	45	275	12.7	16.4
U Westminster	160	35	80	275	12.7	29.1
Edinburgh Napier U	170	40	55	265	15.1	20.8
London South Bank U	180	20	65	265	7.5	24.5
U Derby	205	15	35	260	5.8	13.5
U Gloucestershire	195	0	65	260	0.0	25.0
U Bedfordshire	125	20	95	240	8.3	39.6
U Bolton	135	10	90	235	4.3	38.3
Teesside U	160	5	60	230	2.2	26.1
U Northampton	165	5	55	225	2.2	24.4
Cardiff Metropolitan U	135	10	75	220	4.5	34.1
London Metropolitan U	170	15	35	220	6.8	15.9
U Arts London	160	30	25	215	14.0	11.6
U Buckingham	145	5	45	195	2.6	23.1
Robert Gordon U	95	15	85	195	7.7	43.6
Royal College Art	110	50	35	195	25.6	17.9
U Sunderland	135	5	55	195	2.6	28.2
U Winchester	185	5	5	195	2.7	2.7
Staffordshire U	125	5	55	185	2.7	29.7
Edge Hill U	130	5	15	155	3.2	9.7
Liverpool Hope U	120	10	15	150	6.7	10.0
Institute of Cancer Research	120	15	10	145	10.3	6.9
U Wales Trinity Saint David	100	5	30	135	3.7	22.2
Bath Spa U	100	5	20	130	3.8	15.4

U Worcester	120	0	10	130	0.0	7.7
U London (Institutes etc)	65	25	35	125	20.0	28.0
U West London	95	5	20	120	4.2	16.7
Queen Margaret U Edinburgh	60	20	35	115	17.4	30.4
Royal Veterinary College	85	15	10	110	13.6	9.1
St George's U London	95	5	0	100	5.0	0.0
U Abertay Dundee	55	10	30	95	10.5	31.6
U Chichester	90	0	5	95	0.0	5.3
U Cumbria	75	5	5	90	5.6	5.6
York St John U	75	0	10	90	0.0	11.1
U Highlands and Islands	65	5	10	80	6.3	12.5
St Mary's U Twickenham	60	5	10	75	6.7	13.3
London Business School	10	15	45	70	21.4	64.3
Leeds Trinity U	55	5	5	65	7.7	7.7
Southampton Solent U	55	0	10	65	0.0	15.4
Harper Adams U	40	15	0	60	25.0	0.0
Liverpool School Tropical Med	35	0	20	60	0.0	33.3
Courtauld Institute Art	30	15	10	55	27.3	18.2
Glyndwr U	40	0	10	50	0.0	20.0
Glasgow School Art	25	5	10	40	12.5	25.0
Buckinghamshire New U	35	0	5	40	0.0	12.5
U Creative Arts	30	5	5	40	12.5	12.5
Guildhall School Music Drama	25	5	10	30	16.7	33.3
Bishop Grosseteste U	30	0	0	30	0.0	0.0
Falmouth U	20	5	0	25	20.0	0.0
Royal College Music	10	5	10	25	20.0	40.0
Royal Conservatoire Scotland	20	0	5	25	0.0	20.0
Royal Northern College Music	20	0	5	25	0.0	20.0
Royal Academy Music	10	5	5	20	25.0	25.0
Royal Agricultural U	10	0	10	20	0.0	50.0
Royal Central School Speech D	15	0	5	20	0.0	25.0
Heythrop College	10	0	0	15	0.0	0.0
U St Mark and St John	15	0	0	15	0.0	0.0
U Suffolk	15	0	0	15	0.0	0.0
Trinity Laban Conservatoire M	10	0	0	10	0.0	0.0

Arts U Bournemouth	5	0	0	5	0.0	0.0
Grwp Llandrillo Menai	5	0	0	5	0.0	0.0
Norwich U Arts	5	0	0	5	0.0	0.0
U Wales (Central)	5	0	0	5	0.0	0.0
Combined total						
All institutions	65,125	14,985	32,410	112,520	13.3	28.8

Note: Some tables do not total correctly in the source. This appears to be due to the use of a method of rounding to the nearest unit of 5 in all data.

Source: HESA, <https://www.hesa.ac.uk/data-and-analysis/students/where-study>

▪ Conclusion

The capacity to attract high numbers of postgraduate research students is crucial for the long-term sustainability of any research intensive institution, enabling the reproduction of the next academic generation. Any faltering in the potential supply of high quality postgraduate research numbers at UK universities, where EU and non-EU international students typically account for 40 per cent or more of all postgraduate research effort, and more in the STEM subject areas, would have potentially huge consequences in the longer term.

Just as a great football team relies on an excellent youth academy to train future players and contribute to the wider football arena through transfers, a university must safeguard its future, and the future of the academy, through its postgraduate research students. Like a great football team, a research university must be able to invite in young talent from anywhere. Unlike a wealthy and successful football team that can readily rely on its financial resources to compensate for a sudden absence of talent, a university has limited resources to buy in the best academics. It depends on continued high calibre research to lure staff. In maintaining high quality research, non-UK postgraduates are absolutely crucial to UK higher education.

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