Truly Modern Technical Education

Unleashing the potential of Universities of Technology to really level up

A report by London South Bank University and Aston University

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About this report

This report was commissioned by and published by a collaboration between London South Bank University and Aston University – two leading specialist technical institutions in the UK.

Aston University

More than most universities, Aston University was shaped by its environment and given its mission, by the practical needs of the world around it. The municipal technical college of 1896, founded to supply skilled workers to the workshop of the world, has grown into a leading university giving its students entry to successful careers in science, technology, business and healthcare.

Aston University's close association with industry has continued over the years with innovative approaches which have gone on to be adopted by many others in the sector. Practices such as the sandwich or placement year model which was developed by Aston University in the 1950s and continues now as the hugely successful placement year, or the Innovation Vouchers – invented by Aston University - which support innovation in small businesses and today continue to help West Midlands SMEs to develop new approaches such as low carbon technologies. Aston University's long-established track record with successful Knowledge Transfer Partnerships grows year on year with an average eleven fold return on investment delivered for businesses and a recent 'Best of the Best' KTP Award from Innovate UK. Aston University was also the first in the UK to graduate degree apprentices who had been formally transferred from existing work-based degree programmes onto the degree apprenticeship.

The Aston Law Clinic, the new Institute of Technology, the Computer Industry Club, the innovative Health Leadership Module developed jointly by the Aston Medical School and Aston Business School, the Business Angel investor network and pitching competition developed with regional partners are all examples of innovative initiatives that have grown from their sustained and detailed interaction with employers and business leaders.

The Aston Centre for Growth is at the heart of Aston University's rich ecosystem of leading-edge research and pioneering programmes designed to scale up the region's SMEs, working alongside centres of excellence including the Advanced Services Group, national Enterprise Research Centre, and Centre for Research in Ethnic Minority Entrepreneurship. They deliver programmes in partnership with national providers and high-profile corporates including Lloyds Banking Group and the Goldman Sachs Foundation.

London South Bank University

London South Bank University was formed out of the Borough Polytechnic Institute, founded in 1892. At that time, new industrial competitors were challenging Britain's dominant economic position and London needed programmes of advanced technical education and training.

As it grew, the Borough Polytechnic, later South Bank Polytechnic and then London South Bank University, incorporated other technical provision including the Brixton School of Building (founded in 1904) and the National College of Heating Ventilation, Refrigeration and Fan Engineering (founded in 1947), as well as a range of health education institutes. In the 1930s, the Borough Polytechnic offered the first public courses in plastics; in the 1950s, the first course in nuclear power; in the 1970s, the first honours degree in nursing. In 1987, its 'Technopark' was the first science park developed by a polytechnic.

Employer involvement in the curriculum has always been at the heart of LSBU. Around half of the institution's courses are accredited by professional bodies with the other half informed by employers including through a range of employer advisory panels. Employer sponsorship is also integral with around two-thirds of students studying on courses sponsored by over 1500 employer partners. These relationships and the University's experience in delivering part-time courses have formed the basis of LSBU's extensive higher and degree apprenticeship provision, with the widest offer in the UK and over 2000 apprentices on programmes. From its early days, when courses included 'the machinery of business', the institution has understood the relationship between technical and business skills. In the 1970s, City of Westminster College, one of the largest commercial institutions in London, became part of the Polytechnic; and by the 1990s, South Bank Business School was one of the UK's largest, with around 7000 full and part-time students. Today the relationships between applied research, technical education and business skills underpin the university's extensive business and enterprise offer, including its business incubator, its position as London's largest university provider of European funded business support, and entrepreneurship programmes which are undertaken by around a third of students.

The University is now part of the LSBU Group. In addition to the University, the Group includes South Bank Colleges, South Bank Academies and South Bank Enterprises.

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Foreword

I am delighted to write the foreword for this report: employer-led education is a matter close to my heart. I now play a commercial role as the CEO of the UK arm of a leading global supplier of technology and services. However, I know that my technical education laid the groundwork for later successes as a leader.

As a student at the University of Birmingham, I undertook a 'thin sandwich' Mechanical Engineering degree, which involved an industrial placement with the company – at the time called Worcester Engineering – that I would later lead. Immersion in industry at an early age transformed my capabilities and outlook. I am proud that Bosch Thermotechnology continues to support many apprentices and interns across the business. We are nurturing the people who will help us profitably navigate the future.

Recently, I have sought to amplify such opportunities in our region by helping to establish the Greater Birmingham and Solihull Institute of Technology (GBSIoT). It will deliver higher technical education at Levels 4 and 5, focusing on STEM (science, technology, engineering and mathematics) subjects. Bringing together four Universities and three Colleges in the GBSIoT project has demonstrated for me how technical education can benefit from agile collaboration. This report explains the importance of substantially increasing the pipeline of higher education students in STEM. Via the GBSIoT, I am pleased to contribute to making this a reality.

Aston University and LSBU have much experience in delivering technical education, honed over many years of operation. They are not alone. Both, if asked, would cite many peer institutions – for example, Bristol, Manchester, Sheffield and Warwick – that have outstanding technical expertise and share their strong linkages to industry. What perhaps sets Aston University and LSBU apart is their willingness to operate as specialist Universities in the areas covered by this report.

Of course, I recognise the need for balance in the national provision of education – students from many disciplines are needed to help society function effectively. However, governments have repeatedly sought recognition for the truly technical (and practical) approaches of Universities like Aston and London South Bank in an external environment where such skills are needed but often undervalued. Perhaps this post-Brexit, post-Covid landscape - when we have learned the value of working together towards a common goal – will allow us to properly explore the role technical Universities can play in the future of the UK.

I am pleased to endorse and commend this report to you.

Carl Arntzen
CEO, Bosch Thermotechnology Ltd.

Executive Summary

The current focus of policymakers on higher technical education and on the specialist institutions that deliver them, is welcome, but far from new.

England has seen a litany of attempts to bolster technical education over the decades. This has included countless false starts and half-finished initiatives, which have left us with dozens of institutions that were originally founded with higher technical education as their focus – the former polytechnics, Colleges of Advanced Technology and other specialist institutions.

Each attempt has been confounded by national funding structures and reputational measures of universities which have caused many of these institutions to broaden their offer and in doing so have fuelled a homogenisation of higher education around the traditional three-year residential Level 6 degree. This, in turn, has embedded this "board-school" model as the dominant one within the discourse of policymakers and politicians. This focus, and consequent policy making, has meant that many alternative routes have withered including sub-degree courses; courses designed around part-time and mature learners; and provision in further education.

However, this does not mean, as so often seems to be assumed, that all technical education has ceased to take place in our universities. In reality, there are examples of universities across the country working in concert with industry to supply highly-skilled technicians and to unlock innovation in new products and services – from LSBU training two-thirds of all building service engineers for the construction industry; to the Aston Centre for Growth helping local SMEs to scale up; to Sunderland training automotive engineers for Nissan; to Sheffield pioneering new production techniques through its Advanced Manufacturing Research Centre.

Rather than trying to reinvent the wheel once again, Government objectives would be much better served by addressing the perverse incentives in the current system in order to unleash the potential of its existing Universities of Technology.

Institutions such as Aston University and LSBU do this work *in spite of* a funding and policy agenda that pushes universities to undertake abstract academic research and teach three-year liberal arts degrees. Rather than trying to reinvent the wheel once again, Government objectives would be much better served by addressing the perverse incentives in the current system in order to unleash the potential of its existing Universities of Technology.

As ground-breaking research from Switzerland has shown, it is Universities of Technology that through their innovation and invention, could be the key to levelling-up.[1] In the mid-1990s, a Swiss policy intervention saw the establishment of a swathe

[1] SERI, "Regional Innovation Effects of Applied Research Institutes" (2021) 0117_Ihwpaper.pdf (uzh.ch)

of Universities of Applied Sciences (UASs). These were mandated to focus their research and teaching on applied knowledge and science and in doing so to collaborate with firms; and they had at their heart a focus on translational research. These institutions increased both the quantity of regional innovation and its quality. The report argues that due to the increased technical knowledge in the regions surrounding these UASs, the private and crucially the social value of patents increased. In this way their results show that the establishment of the applied research institutions helped foster innovation outside the normal concentrations by spreading innovation through SMEs[2].

Specialist institutions rooted in their locality can make a significant contribution to the levelling-up agenda. But, if we are to unleash these institutions, then we must support and increase both the teaching of technical qualifications and the undertaking of applied research. One cannot exist effectively without the other and where technical education policy has often gone wrong – despite best attempts – is a too-narrow focus on teaching, especially at sub-degree level.

This paper summarises what London South Bank and Aston University mean, as two leading specialist institutions, by true modern higher technical education; where policy has gone wrong (or not gone far enough); and what more needs to be done to ensure the UK's Universities of Technology can deliver the needs of students, industry and the economy.

What is a modern University of Technology?

First of all, it is necessary to define what technical education is. Technical education, as used in this paper and as delivered through London South Bank and Aston University, is the development of skills and knowledge in a discipline, in a manner which aligns it to a particular area of the labour market and directly supports its practical application. Technical education therefore needs to be defined not solely by discipline but also by the intent and the applied nature of its delivery. This approach can be referred to as vocational education, with technical education being a subset that is principally linked to 'technical' or STEM disciplines. This is how the former Higher Education Funding Council for England (HEFCE) defined it. In contrast, HEFCE defined 'academic education' as the development of skills and knowledge in a discipline, with a view that it will mostly be used in a theoretical application, or that it does not align with a particular career pathway.

It is therefore true that some traditionally 'academic' disciplines such as medicine, based on this definition, fall under what would more strictly be known as 'technical education'. It is also true that – despite the common conflation of technical education with sub-degree provision – "technical" does not prescribe the level at which different types of education take place. The International Standard Classification of Education (ISEAD)[3] defines levels of achievement, with each level containing qualifications that could be considered technical in nature. There is a strong case for growing Level 4 and 5 provision, for the benefit of individuals, employers and the labour market, and this paper will discuss how that should be done. But technical education also includes education at Level 6 and indeed postgraduate level provision at Level 7 and doctoral level, as well.

What then is a University of Technology?

A University of Technology focuses on the creation, enhancement and application of technical knowledge in order to affect the growth of enterprises and enhance productivity in the economy.

It can be characterised in the following ways:

- Its teaching is focused on a smaller number of 'technical' subjects.
- Its research is intended to be quickly applicable to real life, in particular to enhance the productivity of enterprises and of the economy in general.
- It undertakes its activities - teaching and research - in intimate engagement with industry and the professions.
- Whilst globally competitive it has a strong place-based focus.

A University of Technology focuses on the creation, enhancement and application of technical knowledge in order to affect the growth of enterprises and enhance productivity in the economy.

Crucially, it chooses a narrower focus in some areas, in order to excel in others. A University of Technology doesn't teach Greek poetry of the 3rd Century, not because that is unworthy as a discipline, but because that is not its focus. A University of Technology generally doesn't focus on blue skies research – not because there is no need for theoretical research, but because if the work is not close to market it is not easily linked to the university's industrial networks and so is not the focus of the institution. The last element that is central to a University of Technology is management training and the development of human capital. As much data in the UK shows, an absence of sophisticated management capability translates into poor use of existing technology and existing skills and a failure to understand and manage the acquisition of capabilities and opportunities to grow. MIT, one of the world's leading Universities of Technology, has a world class business school at its heart.

[2] Ibid

[3] The International Standard Classification of Education (2011), UNESCO Institute for Statistics

Missing Middles

Philip Augar's Review and the Department for Education (DfE) have rightly put a focus on Levels 4 and 5, - what they describe as the 'missing middle' in technical education. This missing middle needs to be addressed through the provision of suitable alternatives to the three-year academic degree – including shorter, flexible and work-based technical qualifications. In addition to suitable qualifications, Universities of Technology need the support of government in the form of access for learners to appropriate financial support (such as maintenance loans).

Whilst some progress is being made on technical qualifications, there continues to be a failure to join up with another 'missing middle'- applied research, that which takes blue skies research to the market.

This applied research represents another 'missing middle' in our economy particularly in less well performing regions and places, but it is even under-resourced within the 'golden triangle' of Oxford, Cambridge and London where many institutions are more focused on blue skies research funding than research that can be translated into productivity improvements for SMEs. This is particularly important as Government, through the Department for Business, Energy and Industrial Strategy (BEIS) and UK Research & Innovation (UKRI) has promised to double spending on R&D, hitting and exceeding a target of 2.4% of GDP (the OECD average) in the middle of the decade. Professor Richard Jones points out in his paper *Resurgence of the Regions* that 'we need to break out of the trap that many of our towns and urban fringes have found themselves in, where low skills, low innovation and low productivity reinforce each other in a bad equilibrium.' He adds that to break this cycle:

> *We need to raise the demand for skills by attracting inward investment from technologically leading companies and driving up the innovative capacity of the existing business base and create the supply of skills by a much more joined up approach between further and higher education*[4].

'It's 200 yards from the DFE to BEIS but it might as well be a million miles. We won't solve our productivity problem unless we think about skills and innovation together'.

But with the release of the 'Skills For Jobs' White Paper and the Interim Conclusion to Augar's Review there is little evidence of this happening. This has been noted in several responses but perhaps most clearly by Jones in a short series of tweets: 'It's 200 yards from the DFE to BEIS but it might as well be a million miles. We won't solve our productivity problem unless we think about skills and innovation together'.

[4] Richard A. L. Jones, "Resurgence of the Regions: rebuilding innovation capacity across the whole UK" (2019). ResurgenceRegionsRALJv22_5_19 (softmachines.org)

At the core of the productivity and economic challenge in the UK is the need for place-based institutions that can work with students, with businesses, and with R&D capabilities to grow local productivity, create new businesses, grow labour markets, and drive economic growth. The potential gain, in GDP and tax revenues, far exceeds anything that even the most generous government can ever support the UK Higher Education sector with and, crucially, this is the only true way in which the UK government and UK plc can achieve its ambitions for 'levelling-up'. That is the ambition. This paper sets out how it can be achieved.

As part of this report, Public First conducted research to test what SMEs in London and the West Midlands thought about the type of support they received from universities in their local area[5]. The research found that SMEs saw the core role of universities was to 'prepare young people for careers' and 'upskill or retrain adults' and they wanted to see more of this from the sector. They were more likely to want universities to do more in training people rather than doing more to work with them in supporting growth.

SME decision makers who felt that their businesses had been impacted negatively by Covid-19 were less likely to want more/much more help from universities for improving their efficiency. But those respondents whose business had not been impacted or were positively impacted by Covid-19 were more likely to be looking to universities for help to grow. It is possible that some businesses may still see collaboration with universities as a low priority that is abandoned during hard times.

This raises a number of questions for universities, especially modern technical ones at the heart of large urban areas such as Aston University and LSBU. Aston University and LSBU work with thousands of businesses, training apprentices and employer-sponsored students, supplying placement students and undertaking Knowledge Transfer Partnerships. But there still needs to be better alignment between businesses, as agents of growth of productivity and recovery; Whitehall and local government, as guardians of growth; and universities serving this need. Universities must build an offer, locally and nationally, to show their worth – and not be shy about promoting this loudly and proudly. But Government must also consider what incentives SMEs might need to encourage and support them to work with these willing partners.

The Government has already promised to more than double its R&D spending over the next decade. And applied research, which is closer to business R&D and more stimulating of it, more evenly spread across regions and sectors, must be at the top of the list.

Institutions such as Aston University and LSBU are working to join up these missing middles, as are other Universities of Technology throughout the country - supporting their local economies and communities. This report argues that policymakers should take note of this work and consider the following recommendations about how they can unleash the potential of Universities of Technology.

[5] See Appendix, Functions of a university

Recommendations

The recent Skills for Jobs White Paper was a step in the right direction to support Universities of Technology and the expansion of higher technical education. However, on its own it will not be enough to truly transform the future of post-18 learning. Universities of Technology are already driving some of these changes, but the recommendations outlined below and in the body of the argument push us well past the ambition and scope of the Skills for Jobs White Paper to create a system that deals with the UK's productivity challenges and delivers the Government's economic objectives: providing businesses with access to the technology and technical and management skills they need to make best use of it. Universities of Technology are ideally placed to do this.

And if this work with business can be facilitated with investment through the UK Shared Prosperity Fund and other funding, they could be at the heart of the UK recovery.

The recommendations made in this paper are summarised here. They sit within 3 general themes: skills, research and place.

SKILLS: Fundamental funding reform to drive the significant expansion of higher technical education

Recommendation 1: The lifelong learning account should be wholly cashable - allowing for partial payments, and for the balance to be 'saved' by learners for later use. This proposed new financial settlement should also ensure it removes barriers to entry for all individuals through proper maintenance support.

The Skills for Jobs White Paper has set the scene for the introduction of a learner-led system of funding. By establishing a Lifetime Loan Entitlement for all, the opportunity cost of taking out a loan will be shifted. Learners will not be incentivised to use up all of their entitlement in one go, as is the case in the current system, but rather to use it as and when needed to develop the skills at the level and the intensity that is right for them. And while this is highly welcome, in and of itself this will not be enough to drive the type of paradigm shift the Government want to see in student numbers studying at a higher technical level.

To see their potential realised, there are three elements which must be central to the design of the accounts as they are designed and rolled out by 2024. Firstly, they must be cashable. For instance, if one undertook an undergraduate degree and used three quarters of the value of the lifelong learning account, the final quarter should sit waiting and be able to be used easily at a later date for a further qualification such as a masters. Without a sense of real purchasing power, it is unlikely to most effectively drive consumer choice. At present, there is little incentive for an undergraduate student to seek out a lower priced degree course, because they do not 'see' a saving or get to use it, and the repayments over 30 years are almost identical. If a user was able to keep the difference between, say, a year studying a Level 4 certificate costing £6000, and a year on a full honours degree costing £9,250, then we would be more likely to see significant differentiation and purchasing power and choice within the market.

Secondly, the options open to individuals must be wide. With due regard to protection against fraud, individuals must be able to purchase from as wide a variety of properly accredited providers as possible – universities, colleges, and independent training providers.

Thirdly, more thought must go into the regulation of the qualification accrediting and awarding system. Within the Augar Review there was a consideration of using credits. There is therefore a need to ensure these credits build up into a meaningful qualification and that students are protected from acquiring 'bite sized' chunks which don't then amount to meaningful learning outcomes (either in credits or coherence). Analysis of data from English secondary school leavers by NEISR has shown that by the age of 30, individuals that have achieved a Level 4 to 5 qualification in science, technology engineering and maths (STEM) have earnings comparable to or higher than the earnings of STEM degree holders[6]. This research shows that this pathway can lead to just as lucrative wage uplifts as a full degree but at a considerably lower cost to the individual.

There has been much research in this space to show that for adult learners it is not the fees per se that are putting individuals off engaging in further study in the main, but the cost of foregone earnings and time. However, the White Paper was vague on the part that maintenance loans will play in this new jump on and off system.

Recommendation 2: The Government should extend the use of the apprenticeship levy to include employers being able to use it to sponsor employees through approved higher technical Level 4 and 5 qualifications.

Many of the current students who participate in higher technical education, especially as part-time students, do so through sponsored places from employers. These Employee Sponsored Degrees are the original 'learn while you earn' degrees, often found at sub-degree level and with part-time participation. They provide a neat solution that benefits the student, the employer and the Treasury. Making it even easier for employers to contribute would help drive forward a substantial step change in participation.

For the most part, the introduction of the apprenticeship levy has been a success. However, it remains the case that many employers find the process overly cumbersome and bureaucratic and are failing to spend all the levy pot they have accumulated. The Government is therefore right to review this process. But within this review we believe there should be an extension of the scope of the levy pot to

[6] NEISR , "A comparison of earnings related to higher level vocational/technical and academic education" (2019) DP502_0.pdf (niesr.ac.uk)

incentivise employers to sponsor employees through higher technical education. Expanding the scope of the apprenticeship levy so that it could also be used to support employer-sponsored higher technical education - along with the promise of stimulating a more modular credit based higher education qualification system - would result in a substantial increase in part-time and mature study of the magnitude needed.

Recommendation 3: The Government should facilitate and invest in pilot programmes to develop a more collaborative approach between HE and FE that will overcome the cultural and dispositional barriers blocking individuals from engaging in higher technical education. The current proposals on T-Levels need to be rethought if these qualifications are to enhance access to higher technical education.

60% of students do not currently follow the path often assumed for them of GCSEs to A-Level to undergraduate degree. For those that do not follow this path the landscape, as recognised in both the Augar Review and the White Paper, is confusing and complex.

However, while some effort to rationalise the plethora of vocational qualifications may be beneficial, there are significant concerns about the current proposals. The structure of the new T-Levels as single very large qualifications makes them inflexible for learners. Furthermore, it seems that many universities will not accept the new T-Levels as a standard admission qualification. To compound the issue, the proposed defunding of Applied Generals is also likely to prevent many potential students from progressing into technical qualifications at universities. While the concept behind T-Levels may have been to support higher technical education, the result if implemented alongside a defunding of Applied Generals, is likely to do the opposite.

Widening participation is a key activity of universities. LSBU and Aston University have led the way in working in partnership with local schools and colleges to create a simpler pathway from school or college into higher technical education. Through the LSBU Group, London South Bank has overseen the first merger of its kind between a university and college. At the moment, students are often prevented from progressing from stand-alone Level 4 courses delivered by a college due to unclear local pathways. Making the progression routes from Level 4 upwards to Level 5 and into degree level clearer will enable more learners to advance.

The Government is introducing new Higher Technical Qualifications through kite-marking existing and new qualifications at Level 4 where they meet occupational standards[7]. This could foster more collaboration between the sectors by giving an impetus for providers to create new articulation agreements for those learners who wish to continue studying to Level 6. However, as with introducing a credit-based system, the devil is in the detail. The sector and government must be mindful of not creating unnecessary new points of failure in the system for students with these new qualifications.

[7] Prime Minister Boris Johnson's skills speech at Exeter University PM's skills speech: 29 September 2020 - GOV.UK (www.gov.uk)

In order to avoid undermining the progress the Government want to see in higher technical education, it is imperative that real investment is delivered and collaboration between higher education and further education improves so as to increase the pipeline of students.

The Government should consider launching a series of pilot programmes to explore the facilitation of new models and ways of working between FE and HE. To be successful, participating providers would need to be given some exemptions from the current conflicting regulatory and quality assurance regimes of higher and further education which currently hamper collaboration. In return for this, and pilot funding, participants could be expected to agree target outcomes with the DfE.

Recommendation 4: The Government should extend funding so that those over the age of 19 who have yet to secure a Level 2 qualification are supported to do so. It should also ease the restrictions on ELQs to enable more individuals to study at Level 3 in new areas from those in which they already hold an equivalent qualification.

The new Lifetime Skills Guarantee announced in the White Paper will go some way to addressing this by introducing a crucial element of support for learners of all ages to secure a Level 3 qualification.

However, the UK lags behind its international competitors in basic numeracy and literacy skills, and six million adults still do not have a Level 2 qualification to aid their progression to Level 3.

As research from the Centre for Progressive Policy states: 'For learners who do not achieve a Level 2 qualification by the age of 18, almost three in five will not by the age of 25 either[8].'

This is important. It is not just about ensuring all learners have the basic skills needed to gain a Level 2 qualification, but about opening up that pathway to further study so that millions of adults are not stuck in low pay, low skilled jobs with little chance of progression. Although we have seen huge increases in the number of students studying at Level 6 over the past decade, the system is still failing those who leave school without five good GCSEs. If the full recommendation from the Augar Review is not acted upon, the system will continue to fail these individuals.

Equally, the impact of the recession coupled by the rapid changes in work brought on by the pandemic and technological change means some jobs will never return. The need for retraining as opposed to just upskilling has never been higher.

The Equivalent Level Qualification rule (ELQ) will block many individuals from using the Lifetime Skills Guarantee by virtue of them already having achieved a Level 3 qualification potentially decades ago.

[8] Centre for Progressive Policy (2018) "Skills for Inclusive Growth" Skills-for-Inclusive-Growth.pdf (progressive-policy.net)

Easing this rule would be in keeping with the direction of travel set by the Government by not only supporting individuals to upskill but equally by allowing them to reskill into new sectors and be more agile in this fast-changing economic landscape.

RESEARCH: A comprehensive restructure of R&D and a coherent national plan

Recommendation 5: BEIS and the DfE should work together to strengthen the link between skills and R&D, driving innovation and expanding the skills base needed and building on the work that many Universities of Technology have already started. Higher level technical skills are best developed in a context where research and development is taking place and where both are developed and deployed together. The Government is committed to doubling its spending on research and development and has set itself a target of reaching 2.4% of GDP by 2025.

Despite this, however, a crucial recognition of the part that Universities of Technology play in supporting productivity and growth through applied research was absent from the Skills for Jobs White Paper. Supporting the growth in the supply of learners in higher technical education will only solve half the problem if there is not an equivalent increase in the demand for these skills from industry.

A focus on applied research – that is, research which turns innovation into knowledge and knowledge into enterprise - is key to ensuring not only that the UK meets its 2.4% of GDP investment target, but also that it derives a proper return from that investment. Focusing on applied research is also a means of ensuring a 'place'-based return on that investment, so reducing regional and local inequality. Here Universities of Technology can do some of the joining up that the DfE or BEIS are not able to manage from the centre – if they are facilitated to do so.

But as Richard Jones has argued, in the absence of a coherent national plan the UK's R&D will continue to 'reinforce existing inequalities… which will naturally lead to a focus on regions that already have strong private sector R&D capacity' due to the 'place-blind policy' of many of the research councils' funding mechanisms[9]. Although it is important to recognise the difference within, not just between, regions. In London, for example, labour productivity in Tower Hamlets is around 1.9 times higher than it is in Croydon.[10]

Institutes of Technology (IoT), such as the Greater Birmingham and Solihull IoT which Aston University is a part of or the Institute for Professional and Technical Education (ITPE) which LSBU has established are where much of this joining up will happen – with applied research generating credibility in the teaching taking place.

[9] Richard A. L. Jones, "Resurgence of the Regions: rebuilding innovation capacity across the whole UK" (2019). ResurgenceRegionsRALJv22_5_19 (softmachines.org)
[10] Christopher Rocks, "Productivity trends in London: An evidence review to inform the Local Industrial Strategy evidence base" (2019) https://www.london.gov.uk/sites/default/files/productivity-trends-in-london-final.pdf

Recommendation 6: Government should increase investment in applied research within Universities of Technology where it is linked intrinsically to commercial growth that will outweigh the public investment. Investment in this way will lead to more investment.

There is a huge amount of untapped economic potential in Universities of Technology. Both government and those leading our universities should be looking to unlock the benefits of bringing together several agendas to help the recovery from Covid-19 and boost local and national productivity. Along the way this can also drive local innovation, economic growth and job creation. But it will depend on greater and broader investment – from both business and government – as well as on institutions that understand and can deliver it in practice. That means reinventing and supporting universities that can acquire and apply knowledge, especially in the context of particular places and sectors. That provides different value to having a world class research university in the vicinity which will often have a focus on blue skies theoretical research and hence be of less value to SMEs.

Research from the polling showed that very few companies invested significant sums in R&D, and it was larger companies that were more likely to invest in R&D[11]. The findings revealed that 48% of decision makers in SMEs reported spending 0% of their revenue on R&D, with a further 25% spending less than 5% of their revenue on R&D. For those companies that did invest in R&D, they tended to conduct that R&D in house. Most SMEs (81%) who invested in R&D spent a portion of their investment in house, with only 21% of SMEs using external research providers and 6% using universities to conduct their R&D activities.

The reality though is that our economy is founded on millions of SMEs, the vast majority of which (almost 90% in 2020) have fewer than 10 employees. Getting these micro firms to engage with applied research will require more than just outreach from Universities of Technology but a reimagining of the narrative and regulatory and financial framework that incentivises it. It is not enough to assume that if you build it SMEs will come[12].

Recommendation 7: Universities of Technology should continue to play a major role in supporting the wider local innovation ecosystem through their business schools. Every University of Technology should have an ambition to create a business school over the next 5-10 years and offer courses focussed on improving management practices in their local area and dominant industries.

A long-standing issue in the UK's productivity puzzle is the lack of diffusion in firms adopting practices and innovations created by others. At the heart of what many Universities of Technology such as Aston University and LSBU offer is a world class business school which make firms better at adopting new innovations.

[11] See Appendix, Investment and R&D spend
[12] ONS, Number of VAT and/or PAYE based enterprises by parliamentary constituency and employment size bands (2020) UK business: activity, size and location - Office for National Statistics (ons.gov.uk)

John Van Reenan's work shows that variation in management practices accounts for nearly a quarter of the roughly 30% productivity gap between the US and Europe[13]. Effective management is a basic requirement, and its absence is a limiting factor for the success of any business. His findings showed that 'large, persistent gaps in basic managerial practices were associated with large, persistent differences in firm performance[14].' His research suggests that improvements in management practices can reinforce the benefits of any skill improvements in their workforce and that better managed firms spent ten times as much on research and development suggesting that 'they were not sacrificing innovation to efficiency[15].' Management in this sense can be thought of as not just a skill that is taught and used but as an active ingredient for applying research and supporting local, regional and sectoral growth.

Business schools will play a significant role in improving productivity and local growth by building management and leadership skills and capacity in the public, private and social sectors and supporting entrepreneurship. This includes using apprenticeships to enable retraining and management training. This report therefore welcomes the promise through the 'Help to Grow' scheme to boost productivity by offering 30,000 SMEs heavily subsidised access to management training through business schools. Together these links will also boost universities' capacity to understand and work with local government and help underpin new civic relationships and agreements.

PLACE: Joined-up thinking across government in the context of towns, cities and regions

Recommendation 8: Universities should be asked to play a leading role in the development of local economic or industrial strategies, in applying research and knowledge for local/regional employers in key sectors and maintaining the supply of skills to them.

There are of course many spill-overs from the research efforts coming out of universities including high wages, human capital and multipliers from local spending. But ambitions to improve productivity and to level up require other institutions too – in this case, universities that understand and act in a local or specialist context – institutions that apply knowledge and innovation through both research and teaching. There are institutions like LSBU and Aston University that can – and do – join up and fill both 'missing middles.'

It is also the job of universities to ensure that all communities and individuals can have access to good jobs in the public, private and third sectors and/or support in starting businesses. Universities should be central to the creation of each of the new Local Skills Improvement Plans and Ministers should be encouraged to scrutinise them for concrete commitments from the HE sectors, in return for greater support for Universities of Technology referred to and recommended elsewhere in this paper.

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[13] National Bureau of Economic Research, "Management Practices Across Firms and Countries" (2012). Microsoft Word - Bloom_final_APM.doc (nber.org)
[14] Harvard Business Review, "Why do Undervalue Competent Management?" Why Do We Undervalue Competent Management? (hbr.org)
[15] Why Do We Undervalue Competent Management? (hbr.org)

Chapter 1: The first missing middle – Technical Education

Technical Education in the UK has been hidden away

There is a longstanding view that the UK has and remains unserved by technical education. Despite regular 'once in a generation' policy announcements, the culture that prevails is one in which many parents and students see the GCSE to A-Level to full-time three-year university course route as the only one worth taking. This is partially down to a misunderstanding of technical education, which includes degree and postgraduate level study in areas which command high esteem but are also considered academic – such as engineering, medicine and architecture. In fact, 39% of students enrolled in UK universities within a technical subject in 2019.[16]

39% of students enrolled in UK universities within a technical subject in 2019.

But what undoubtedly remains true is that non-degree forms of technical education, including at Levels 3, 4 and 5 and/or taking place outside of university settings, have suffered from low esteem, and to an extent still do, as well as a historic lack of adequate funding and ambition. There have been many attempts to address this imbalance from Colleges of Advanced Technology (CATs) in the 1950s with a focus on teaching advanced technology to university level; to the 1963 Robbins Report arguing that undergraduate places should be available, 'to all who were qualified for them by ability and attainment'; to the end in the 1990s of the 'binary divide' with John Major's removal of 'the barriers between the academic and vocational streams.'

The UK has, as a result, a broadly homogenous higher education sector

The introduction of tuition fees and the lifting of the student cap in 2012 has caused the proportion of full-time three-year degrees (as a proportion of all undergraduate degrees) to skyrocket from 30% to more than 50%. At the same time, the increase in fees has led to sharp declines in almost everything else in the sector, especially part-time and mature learner's study.

[16] Using HESA data Table 49 - HE student enrolments by HE provider and subject of study 2019/20 | HESA and counting the following enrolments as technical; medicine and dentistry, subjects allied to medicine, biological and sport sciences, veterinary sciences, physical sciences, general and others in sciences, mathematical sciences, engineering and technology, computing, architecture, building and planning. It should be noted this is a purely illustrative example based on STEM subjects of a vocational nature.

Figure 1 [17]

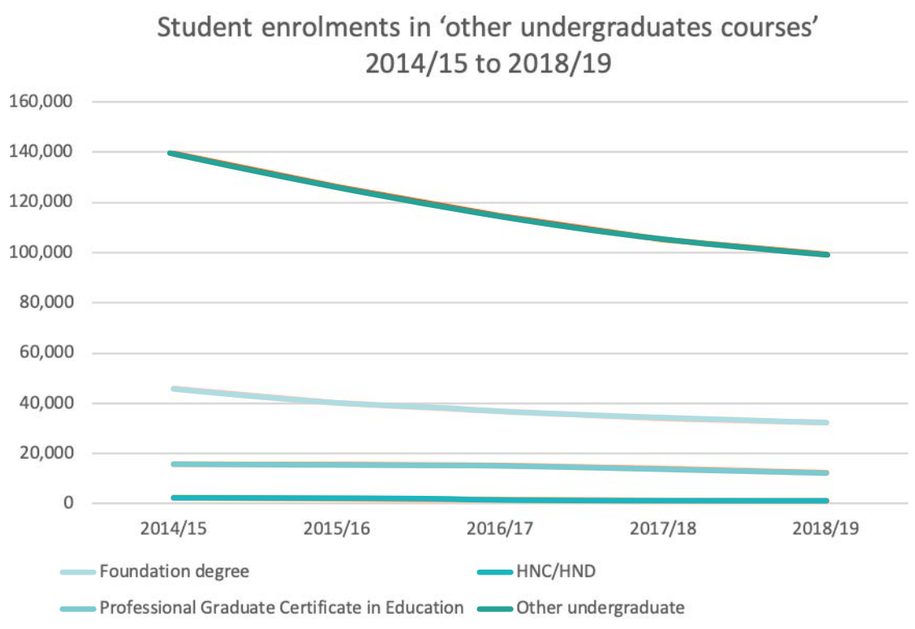
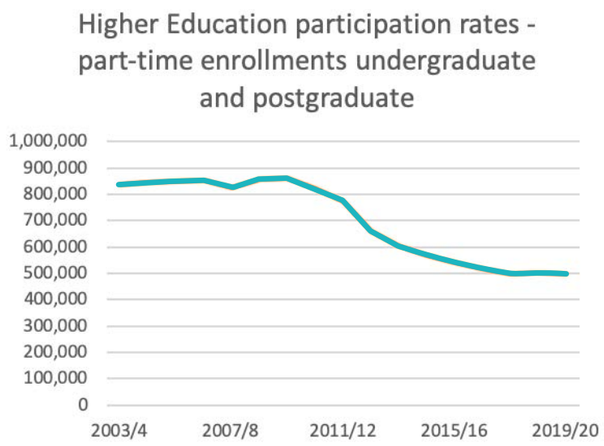


Figure 2 [18]

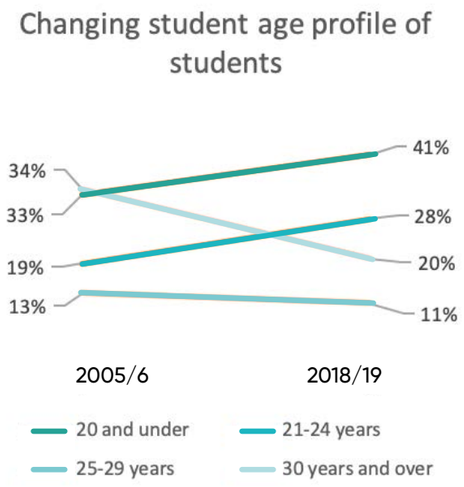


Since 2014, student enrolments in full-time 'other undergraduate courses' have fallen 28%, whilst those enrolling in a full-time first degree have risen 8% - a trend unlikely to diminish in the near future.

At the same time, from a peak of almost 590,000 in 2008/09 part-time undergraduate student numbers fell to just under 270,000 in 2019/20; a fall of 54%.

[17] HESA,"HE student enrolments by level of study 2014/15 to 2018/19" https://www.hesa.ac.uk/data-and-analysis/sb255/figure-3 (accessed February 2021)
[18] House of Commons Library, "Part-time undergraduate students in England" Part-time undergraduate students in England - House of Commons Library (parliament.uk)

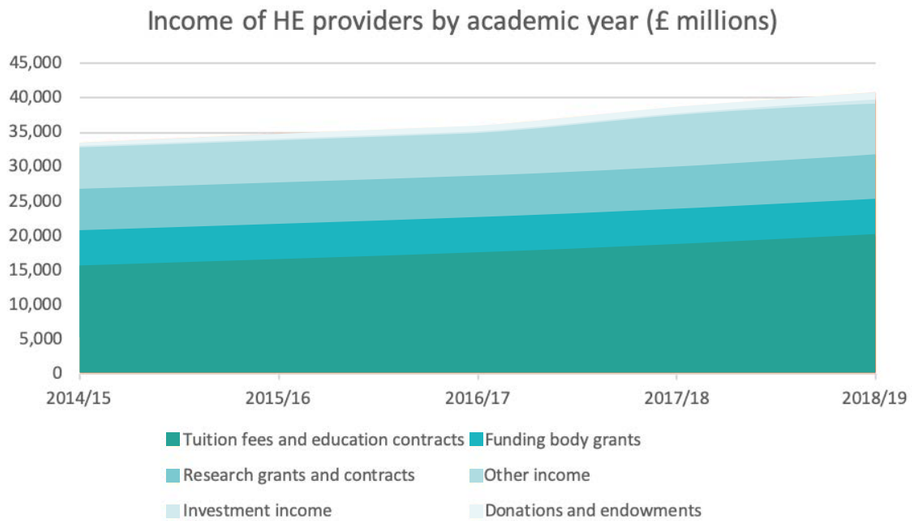
Figure 3 [19]



Students have also been getting younger. Whilst there has been some stabilisation of this in recent years - albeit with a dip in 2012 - the total number of mature undergraduate entrants has fallen rapidly, particularly for those studying for other undergraduate courses and part-time.

Where Universities of Technology have been able to maintain alternate provision, it has been by working outside the principal funding structures. London South Bank, for example, has around 1000 students studying part-time on Level 4 and 5 programmes, principally in the Construction Division. This is made possible by the fact that around 90% of these students are sponsored by employer and study on a day-release model – as HNCs are a valued qualification within the industry.

Figure 4 [20]



[19] HESA, "HE student enrolments by personal characteristics 2015/16 to 2019/20" https://www.hesa.ac.uk/data-and-analysis/sb258/figure-5 (accessed February 2021)
[20] HESA, "Income of HE providers by location and category 2014/15 to 2018/19" https://www.hesa.ac.uk/data-and-analysis/finances/chart-1 (accessed February 2021)

While the fall in mature and part-time students has been a story of long-term decline this has been exacerbated by the introduction and then rise of fees.

Another unintended consequence of the 2012 reforms has been a reduced income differential between high and low-cost subjects. Universities receive the same level of student fees regardless of course cost. Except in the case of medical subjects, the Government provides only a relatively modest top up for high cost subjects such as those offered by Universities of Technology. This creates an incentive for these universities to cross subsidise strategic STEM subjects with cheaper to run humanities courses with an inevitable reduction in focus on technical subjects, despite the renewed priority of government to increase STEM graduates. Figures from the Russell Group show an ever-widening gap in funding for undergraduate courses, particularly in high-cost subjects such as STEM and medical education[21]. However, even courses in the social sciences and humanities now face significant deficits per student per year as well. This puts both the quality of provision and the range of choices available to students at risk, as well as impacting on the ability of the UK to train the next generation of skilled workers, including scientists, engineers, public servants, medics and nurses[22].' The newly announced increase in high-cost funding for strategically important subjects will go some way to help[23].

Augar Review – a game-changer?

With this backdrop in mind, in 2018 the then Prime Minister Theresa May announced a wide-ranging review into the state of post-18 education, led by Philip Augar. The review made the case for the introduction of a system of more flexible learning at Levels 4 and 5 characterised by the introduction of a lifetime learning loan allowance. This was based on the recognition that financial incentives were the fundamental cause of declining participation in technical qualifications, and part-time, mature and Levels 4 and 5 enrolments. This recommendation was intended to offer an alternative to the 'one shot' full-time three-year Level 6 course for 18-year-olds at universities. By allowing learners to step on and off using their lifetime allowance throughout their careers when needed, rather than encouraging them to use their full allowance in one go, the lifetime learning loan allowance could encourage participation across the full spectrum of tertiary education. It is hoped that this change, in tandem with the introduction to degree courses of interim qualifications at Levels 4 and 5, will solve the problem of a perverse incentive structure whilst also bolstering the long-term cultural issues around esteem of these lower qualifications.

While this paper welcomes the proposed increased flexibility of both the loan and qualification system it also has some words of warning about the implementation. More nuanced thinking is needed. Having a step on step off system assumes using a system of credits. However, it is crucial that these credits build up into a meaningful

[21] Russell Group, "Russell Group analysis based on data from the OfS shows declining funding for undergraduate teaching" (19 November 2020)
[22] Ibid
[23] Letter from SoS Gavin Williamson to The Office for Students rt-hon-gavin-williamson-cbe-mp-t-grant-ofs-chair-smb.pdf (officeforstudents.org.uk) (January 2021)

qualification and that students are protected from acquiring 'bite sized' chunks which don't then amount to anything as a whole (either in credits or coherence). For example, if an individual accumulated 360 credits through perhaps 30 credits in accountancy, and 90 credits in surveying from a different institution would this amount to a 'degree'? And if so, who awards it? Would it be recognised abroad? But equally, in what way can prior learning be recognised so that those who have amassed a huge amount of experience and expertise in the workforce or elsewhere can bring this to bear consistently between institutions. These are all questions which the Government needs to understand and answer. The recent Skills for Jobs White Paper, while hampered somewhat by the pandemic and the associated lack of long-term funding attached to it at this point, went some way to pave the way for this boost in technical higher education at Level 4 and 5 to come to fruition.

The plan outlines a sustained commitment to support providers to expand higher technical courses at Level 4 and 5 and incentivise more flexibility and modular provision. The rollout of these higher technical qualifications will be based on the Institute for Apprenticeships and Technical Education's employer led apprenticeship standards enabling, at least potentially, a clearer progression route from Level 3 T levels into higher technical education.

This is underpinned by the new lifelong loan entitlement recommended by Augar, which the White Paper asserts will make 'it is just as easy to get a loan for a higher technical course as it is for a full-length university degree[24].' If the Government can get this right along with the promised expansion of provision and introduction of modular and flexible qualifications it will have a transformative effect on post-compulsory education.

A renewed focus on ensuring there is a pipeline of students able to study at higher level through more links between the HE and FE sectors

Lambeth College joined the Group in January 2019 and is the first higher and further education merger of its kind.

In order to tackle the complex system learners face, and the failure of society to address the needs of the left-behind group of learners who do not progress past Levels 2 or 3, London South Bank has established the LSBU Group. In addition to the University, the LSBU Group contains South Bank Colleges, South Bank Enterprises and South Bank Academies (comprising a UTC and an Engineering Academy). Lambeth College joined the Group (transferring to South Bank Colleges) in January 2019, as part of a national pilot and is the first higher and further education merger of its kind.

[24] Department for Education, "Skills for Jobs: Lifelong Learning for Opportunity and Growth" (2021) (publishing.service.gov.uk)

In this way, LSBU has looked to support its local community by forming identifiable pathways using Standard Occupational Classifications (SOC) analysis to align course offers (including apprenticeship programmes) at the College and University into clear career pathways. In 2022 the Group will also open at Vauxhall the first new technical college in a generation with courses focused on Levels 2-4 designed to specifically address this 'missing middle'.

In order to avoid undermining the progress this report wants to see in higher technical education, it is imperative that real investment and more collaboration between higher education and further education happens to increase the pipeline of students.

Now is the time to unleash some experimentation, innovation and collaboration between and within the two sectors to seek to find as many different ways of plugging this crucial missing middle as possible. In the same way that removing schools from local authority control brought new freedoms, and the free school movement brought new models and ways of working to the school system; FE-HE pilots could bring about new opportunities. Pilot funding should be given to HE and FE institutions working in partnerships, which should also be released from some of the structures of the current regulatory regimes in order to foster experimentation. Executives of the partner institutions would be made wholly accountable for their outcomes with some parameters directly agreed with the Department for Education to see what benefit and innovation comes.

Southwark Health Skills Centre

The Southwark Health Skills Centre provides the people of Southwark and surrounding boroughs with access to careers pathways in health and social care whatever their age and whatever their educational starting point. It offers a range of health sector outreach, recruitment and education opportunities, training new recruits, and upskilling current staff. The Centre has been created by LSBU Group in partnership with Guy's and St Thomas' NHS Trust (GSTT) and Health Education England. It is situated just 5 minutes' walk from Guy's Hospital and has a central role in supporting GSTT's work on Workforce Diversity and the Workforce Race Equality Standard.

The Centre offers education and training from pre-entry to post-doctoral level for clinical and non-clinical roles with each delivered by experts from the relevant institutions within LSBU Group. The Centre draws especially on the expertise of LSBU's Institute of Health and Social Care, which is a leading provider of health and social care education and training; South Bank Colleges; and South Bank UTC, with its specialisms in Health and Social Care and Health Engineering, and of which Guy's and St Thomas' NHS Trust is a sponsor.

Securing a pipeline of students into Universities of Technology

The Lifetime Skills Guarantee ensures all adults are able to access their first level 3 qualification. However, there are still around six million adults in this country without a Level 2 qualification[25]. While English and Maths tuition is currently fully funded for all, and for those under 24 tuition is funded in all Level 2 qualifications, for those over 24 the funding was cut in half in 2016/17. Unsurprisingly, there has been a huge reduction in the number of full Level 2 adult learners from over 400,000 in 2012/13 to just over 50,000 in 2017/18, with even fewer going on to actually achieve the qualification.

To improve the pipeline through to Level 3 and thence into Universities of Technology, there needs to be a restoration of full funding for adults of all ages to gain their first full Level 2 qualification.

As research from the Centre for Progressive Policy shows, 'For learners who do not achieve a Level 2 qualification by the age of 18, almost three in five will not by the age of 25 either.'[26]

The research found that for young people completing an apprenticeship:

> *Progressing from Level 2 to Level 3 increases an individual's annual earnings by more than £2,000 in the first year. And for those who can get any level three qualification they are, '19 percentage points more likely to escape low pay than those with no formal qualifications.*[27]

The Work Foundation has found that:

> *1.4 million mid-career workers with level three qualifications (the equivalent of A-levels) in routine or manual occupations would currently be ineligible for the Lifetime Skills Guarantee... despite being amongst those most likely to benefit from training to help them progress into higher paid work.*[28]

This is due to a rather arcane rule, the Equivalent or Lower Qualification rule (ELQ), which successive university ministers have tried to grapple with. It states that you can't get funding for a qualification that is equivalent or lower than you already have. In post-Covid times when we are facing mass redundancies on a potentially unprecedented scale and in a changing economy where few have a job for life, this seems at odds with what the Government is aiming to achieve.

Easing this rule would be in the spirit of the direction of travel set by the Government by not only supporting individuals to upskill but equally by allowing them to reskill into new sectors and be more agile in this fast-changing economic landscape.

Extending the apprenticeship levy to allow employers to sponsor employees through higher technical education would meet people where they are

For the most part, the introduction of the apprenticeship levy has been a success. However, it remains the case that many employers find the process overly cumbersome and bureaucratic and are failing to spend all the levy pot they have accumulated. This is backed up by research from the poll which showed that for SMEs the main barriers to investing in training for their workforce were a lack of time to disrupt production/service and a lack of time to focus on finding the right training.[29] The Government is therefore right to review this process. But within this review this report believes there should be an extension of the scope of the Levy to incentivise employers to sponsor employees through higher technical education. As a report from HEPI concluded, employer-sponsored degrees are the 'original earn while you learn' course and a renewed stimulation of them could help to reverse the trend discussed above on falling mature students and part-time student numbers.[30]

The privilege government affords to apprenticeships and its reluctance to utilise the levy pot in the most effective way could actually be doing more to damage the expansion of higher technical education than the benefit the levy brings, especially for SMEs. As opposed to apprenticeships, employer-sponsored degrees are relatively easy and flexible for employers to access[31]. This is due to the pathways being broken down into smaller accredited parts such as HNCs, HNDs and so on, providing significant flexibility for employers on the time and funding they commit to supporting an employee with.

If the Government committed to an expansion of the scope of the apprenticeship levy so that it could also be used to support employer-sponsored higher technical education along with the promise of stimulating a more modular credit based higher education qualification system, the impact on increasing part-time and mature study would be substantial.

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[25] Secretary of State for Education, "Independent panel report to the Review of Post-18 Education and Funding" (publishing.service.gov.uk) (May 2019)
[26] Centre for Progressive Policy (2018) "Skills for Inclusive Growth" Skills-for-Inclusive-Growth.pdf (progressive-policy.net)
[27] Ibid
[28] Work Foundation, "Learning to Level Up: The role of skills in tackling job insecurity through Brexit and Covid-19" (2020) 7056-WorkFoundationReport-A4 (lancaster.ac.uk)

[29] See Appendix, Upskilling/training: planning
[30] Higher Education Policy Institute, "Making a Success of Employer Sponsored Education" Making-a-success-of-Employer-Sponsored-Education-Report-83.pdf (hepi.ac.uk)
[31] See Appendix, Upskilling/training: planning

Employer-led education

Central to much University of Technology provision is a substantial commitment to work with employers on course design and delivery – to make sure that programmes meet the needs of modern workplaces. LSBU has a long history of providing employer-sponsored study and so has subsequently become an advocate of higher and degree apprenticeships. With over 2000 apprentices enrolled, the University is one of the largest higher and degree apprenticeship providers in the country, teaching the widest range of standards of any UK university, including in architecture, civil engineering, surveying, construction and nursing.

Since 2018, the LSBU campus has been home to the Passmore Centre - the UK's first dedicated university centre for apprenticeships and technical and vocational education which spans all core skills levels. The centre serves as a one-stop-shop for employers to: discuss upskilling existing staff; recruit apprentices from Levels 2-8; and interact with academics to match course content to their needs. The creation of the Passmore was made possible by the financial support of Southwark Council who work in partnership with the university to help local residents to access apprenticeships and other training opportunities.

Apprenticeships (and other forms of employer-sponsored study) provide a valuable route for employers seeking to train-up employees where there is shortage of suitably qualified graduates, particularly in specialist technical areas. Through apprenticeships and other employer-sponsored study, LSBU trains approximately two-thirds of the country's building service engineers and is the first organisation to offer rail and rail systems apprenticeships to tackle skills needs in that industry.

The University works closely with NHS partners to help them utilise their apprenticeship levy funds. There are many existing support workers within NHS trusts who, despite valuable experience of patient care, are unable to undertake nursing apprenticeship programmes due to the requirements around English and maths qualifications. In 2020, Lambeth College (part of LSBU Group) was awarded an Innovation Grant by the Greater London Assembly to provide NHS health care support staff with a development programme which will help enable them to achieve the required skills in English and maths to progress into pre-registration programmes and apprenticeships.

There remains a need to ensure that all those studying high quality courses can receive support for living costs

In the current funding landscape, Level 4 students are able to access maintenance loans. However, students studying for a Higher National Certificate, a Higher National Diploma, Level 4 NVQ or higher apprenticeships through a part-time route at accredited providers are not. Again, if the Government is serious about significantly growing study for all learners, especially those who for various situational factors such as financial or family commitments will not be able to study full-time or reduce their hours in order to be able to study part-time, it needs to make maintenance loans available for all Level 4 learners. Research from Million Plus has suggested that maintenance costs are the main financial preoccupation of mature students[32].

The White Paper did not reveal a strong commitment either way from government on this issue, despite the recommendation from the Augar Review calling for the variation in financial support to cease and for all students at Levels 4 to 6 to be treated equally under a single system of maintenance[33]. This report therefore seeks clarity from the Government on what its intentions are.

Analysis of data from English secondary school leavers by NEISR has shown that by the age of 30, individuals achieving a Level 4 or 5 qualification in science, technology engineering and maths (STEM) subjects had earnings comparable to or higher than the earnings of STEM degree holders[34]. This research shows that this pathway can lead to just as lucrative wage uplifts as a full degree but at a considerably lower cost to the individual.

We know therefore that Level 4 and 5 qualifications are often seen as a more attractive offer for mature students as they require less commitment than a bachelor's degree in terms of time and money and can still lead to substantial salary gains.

Currently, students studying for a Higher National Certificate, a Higher National Diploma, Level 4 NVQ or higher apprenticeships through a part-time route are not able to access maintenance support and this shows no sign of changing. However, due to the small numbers it would require a relatively modest financial investment from government to rectify this. For the 3,185 part-time HNC and HND students currently in this system, it would cost in the region of £15 million a year to provide maintenance loans, and to double the number of students would cost around £30 million a year.

[32] Million Plus, "Forgotten learners, building a system that works for mature students" (2018)
[33] Secretary of State for Education, "Independent panel report to the Review of Post-18 Education and Funding" (publishing.service.gov.uk)
[34] NEISR , "A comparison of earnings related to higher level vocational/technical and academic education" (2019) DP502_0.pdf (niesr.ac.uk)

Chapter 2: The second missing middle – Applied Research

In the UK we've had a prolonged period of productivity stagnation. A driving force of which is high levels of spatial inequality.

According to Martin Wolf writing in the *Financial Times* in early 2020:

> *The aggregate productivity performance of the UK economy since the financial crisis of 2007-08 has been its worst by far since 1860. Never before over this long period has there been such a prolonged period of productivity stagnation.*[35]

UK real wages and productivity have stagnated since 2007. With the Covid pandemic instigating a new economic crisis, this has created an urgent need, as the economy reopens, to address the problems underlying this poor productivity by driving innovation, increasing skills, and utilising them through improved management.

One significant aspect of our poor productivity is our strikingly high levels of spatial inequality - both between and within regions. According to Professor Phillip McCann, among advanced economies, the UK is:

> *the most unbalanced and unequal country across the largest range of indicators [with] almost half of the UK population [living] in regions whose productivity (the best proxy for economic prosperity) is no better than the poorer parts of the former East Germany.*[36]

Out of the 179 NUTS3 areas within the UK, 159 areas have productivity levels below the UK average[37]. In 2018, the International Monetary Fund (IMF) also noted that there are 'long-standing disparities in labour productivity across UK regions', which are 'large compared to other advanced economies.'[38] The IMF argues that interregional inequality in the UK is likely related to overall inequality and may signal untapped economic potential in underperforming places. Significant disparity can even exist within rich regions. Within London, labour productivity in Tower Hamlets for example, is around 1.9 times higher than in Croydon.[39]

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[35] Financial Times, 'The UK's employment and productivity puzzle' (30th January 2020)
[36] Productivity Insights Network, 'Are Britain's Regional Divides Large or Small? A response to Chris Giles' (2019) https://productivityinsightsnetwork.co.uk/2019/05/britains-regional-divides/
[37] The Nomenclature of territorial units for statistics, abbreviated as NUTS is a geographical classification that subdivides territories of the European Union (EU) into regions at three different levels (NUTS 1, 2 and 3, respectively, moving from larger to smaller territorial units). NUTS3 in the UK are primarily individual counties and unitary authorities
[38] IMF (2018). Country Report No. 18/43: United Kingdom: https://www.imf.org/en/Publications/CR/Issues/2018/02/13/United-Kingdom-Selected-Issues-45628
[39] Christopher Rocks, "Productivity trends in London: An evidence review to inform the Local Industrial Strategy evidence base" (2019) https://www.london.gov.uk/sites/default/files/productivity-trends-in-london-final.pdf

Universities as civic institutions have a key role in addressing this

HE and FE reform (as well as R&D policy) must acknowledge and support universities' role in addressing spatial equality, reconfirming their important role as civic institutions which promote economic and social recovery. That means a policy framework that understands not just the gaps between the West Midlands and London and the South East, but the equally steep differences within the West Midlands and London such as those between parts of Inner Birmingham and variations across the boroughs of Inner London.

HE and FE reform must acknowledge and support universities' role in addressing spatial equality.

GVA per head in the West Midlands is one of the lowest in the country, less than £21,000 per head compared to over £43,000 in London and the £27,555 national average (ONS, 2017). According to Anne Green at City REDI, labour productivity in the West Midlands in 2017 was 11.9% behind the national average even though between 2010 and 2017, overall productivity had risen by 5% – the highest increase in the UK. In 2018, the West Midlands had an unemployment rate of over 5.1% (compared to 3.9% for the UK overall), and 16% of its population has no qualifications (compared to 9% nationally).[40]

In inner south London, Southwark, Lambeth and Wandsworth arguably have more in common with poorer parts of other cities than they do with the Square Mile or the West End, with issues such as considerable inequality and social problems juxtaposed against significant employment opportunities and industries within easy geographical reach.

London is the UK's richest and most productive city with the highest levels of GDP and GVA. But it is also its poorest and most unequal. Of all regions, London has the highest proportion of households in the top tenth of incomes nationally, and the highest proportion in the bottom tenth. The capital has the highest rate of income poverty of any English region, and inner London has the highest rates for all age groups including children, working-age adults and pensioners after housing costs are taken into account. Inequality in London grew during the economic boom between the late 1990s and 2008, as the incomes of the richest accelerated and poverty rates remained unchanged[41]. So, the challenges for universities in London and Birmingham are different in some respects and similar in others – whatever the relative successes and strengths of local economies and labour markets, they still both seek to teach, train and to apply knowledge. They both seek to support people, firms and public services in their areas and to act as 'civic institutions'.[42]

[40] University of Birmingham, "Regional Productivity Differences, Skills and Inclusive Growth: Survey Findings" https://www.birmingham.ac.uk/Documents/college-social-sciences/business/research/city-redi/Projects-Docs/Productivity-Project-Survey-Results.pdf
[41] LSE, "Poverty and inequality in London: anticipating the effects of tax and benefit reforms" (2011) https://www.lse.ac.uk/geography-and-environment/research/lse-london/documents/Reports/Poverty-and-inequality-in-London.pdf?from_serp=1
[42] The final report of the UPP Foundation Civic University Commission (2020), Truly Civic Civic-University-Commission-Final-Report.pdf (upp-foundation.org)

Aston Centre for Growth

Aston Centre for Growth provides leading growth programmes and other practical business support for entrepreneurs, SMEs, business leaders and students across the West Midlands.

The Centre has experience of working with hundreds of SMEs to support their business growth through high profile programmes such as the Aston Programme for Small Business Growth, Goldman Sachs 10,000 Small Businesses programme and Productivity through People, alongside investment ready pitching competitions, student and graduate focused start-up support and enterprise skills development.

ERC, the national Enterprise Research Centre run jointly by Aston University and the University of Warwick, operates at Aston University within the Centre for Growth. It aims to transform the national and regional economy by undertaking cutting edge practical research on SMEs on such topics as productivity, innovation, international trade, local growth, business dynamism, leadership, and management skills as well as diverse and inclusive entrepreneurial ecosystems.

The Centre for Growth is heavily involved in developing the newly announced government funded Help to Grow: Management programme which aims to help small and medium sized businesses across the UK learn new skills, reach new customers and boost profits through a twelve-week management course.

But policymakers must also understand the second missing middle

A crucial factor in our poor productivity performance is the under-resourcing of applied research. Historically the UK has been a powerhouse for research and development, but two crucial events resulted in the UK falling behind compared to more advanced industrial economies. These were both summarised by Richard Jones recently in his paper on the UK's innovation deficit[43]. Both began with the Thatcher government but were continued and accelerated through the Blair years. The first is the 'excessive financialisation' and 'endemic short-termism' of the UK economy. This, according to Richard Jones, has resulted in businesses - even very large ones - chasing short-term profit for stakeholders at the expense of investing back into innovation for their products or services. The second is a lack of industrial strategy. Writing in 2019, Richard Jones observes that:

> *This was driven by a view that state spending crowds out private sector investment. Since then it has become clearer that the reverse is true... Rather than 'crowding out' business R&D, state spending on R&D 'crowds in' further investment by the private sector.*[44]

David Willetts in *The Road to 2.4%* points out that our interest and capacity in commercialisation via applied research has been a long-standing problem.

> *The increase in spending ... is an opportunity to tackle our crucial and widely recognised weakness in successfully applying our brilliant research, which has dogged us ever since the Government first discovered the value of R&D during the First World War. The very first White Paper on the subject in 1915 observed that in Germany, 'science there has been more effectively applied to the solution of scientific problems bearing on trade and industry.* [45]

Willetts recounts that the withdrawal from applied research during the Heath and Thatcher Governments followed from their argument that businesses should be buying applied research and that 'near-market' research was the responsibility of business, with government focused on upstream science. It leaves, he argues 'a massive gap between the pure science that is publicly funded and the kind of applied, immediately valuable R&D that companies are willing to pay for'. These twin issues are further compounded by the 'Matthew effect' created by the 'place-bind policy' of many of the research councils' funding innovations, Jones says:

> *The seven research councils have long operated a policy of not having a regional policy, instead being committed to distributing research funds solely on the basis of excellence as measured by peer review, a process that through the 'Matthew Effect' is always likely to reinforce existing inequalities. InnovateUK's strategy is to be 'business-led', which will naturally lead to a focus on regions that already have strong private sector R&D capacity.* [46]

In practice this has resulted in research and development investment concentrating more on specific types of research as well as on the institutions and places where it has been done - intensifying the spatial inequality already present in the UK economy and creating a deep structural weakness characterised by a 'low innovation, low skills, low wage equilibrium' in certain regions.

In other words, this is a problem not just of research being unequally distributed but also of a shortage of applied research that can be translated into productivity improvements for SMEs. When distributing funding for applied research, we should be mindful of not just looking at total funding allocated but equally the split between theoretical and translational so that Universities of Technology in the 'golden triangle' especially are not adversely affected.

Research from the report's polling showed that very few companies invested significant amounts in R&D, although larger companies were more likely to invest in it[47]. The findings revealed that 48% of decision makers in SMEs reported spending 0% of their revenue on R&D, with a further 25% spending less than 5% of their revenue on R&D. For those companies that did invest in R&D, they tended to conduct that R&D in house. Most SMEs (81%) who invested in R&D spent a portion of their investment in house, with only 21% of SMEs using external research providers and 6% using universities to conduct their R&D activities.

The reality is that our economy is founded on millions of SMEs the vast majority of which (almost 90% in 2020) have fewer than 10 employees[48]. However, the polling found that it was larger businesses who were more likely to want to see more application of research and innovation into the economy than their smaller counterparts[49]. Getting these micro firms to engage with applied research will require more than just outreach from Universities of Technology but a reimagining of the narrative and regulatory and financial framework that incentivises it, as for those that do invest this report's polling found that 92% found it beneficial.[50]

[43] Sheffield Political Economy Research Institute, "The UK's Innovation Deficit & How to Repair It" SPERI-Paper-No.6-The-UKs-Innovation-Deficit-and-How-to-Repair-it-PDF-1131KB.pdf (shef.ac.uk)
[44] Richard A. L. Jones, "Resurgence of the Regions: rebuilding innovation capacity across the whole UK" (2019) ResurgenceRegionsRALJv22_5_19 (softmachines.org)
[45] David Willets, "The Road to 2.4 percent: Transforming Britain's R&D performance" the-road-to-2.4-per-cent.pdf (kcl.ac.uk)
[46] Richard A. L. Jones, "Resurgence of the Regions: rebuilding innovation capacity across the whole UK" ResurgenceRegionsRALJv22_5_19 (softmachines.org)
[47] See Appendix, Investment and R&D spend
[48] ONS, Number of VAT and/or PAYE based enterprises by parliamentary constituency and employment size bands (2020) UK business: activity, size and location - Office for National Statistics (ons.gov.uk)
[49] See Appendix, Functions of a University
[50] See Appendix, Investment and R&D spend

Strengthening applied research – creating a new institutional narrative

The Government to an extent intends to remedy this by doubling spending on R&D, meeting a target of 2.4% of GDP (the OECD average) in the middle of the decade. At both the 2017 and 2019 General Elections, all political parties committed to going further and hitting 3%. The Government has also put its Industrial Strategy and various levelling-up initiatives front and centre of its policy agenda. Here, applied research which stimulates more business R&D and is more evenly spread out across regions and sectors must be top of their list of priorities.

Applied or translational research – that is research which turns innovation into knowledge and knowledge into enterprise - is key to ensuring that the UK not only meets the target of investing more through hitting and exceeding the 2.4% target but that it also comes with a new focus on 'place' and regional and local inequality. Here, Universities of Technology can do the joining up that the DfE or BEIS cannot manage on their own. As Ottoline Leyser, the new Chief Executive of UKRI has observed, science and knowledge economies 'can't just be something that happens somewhere else.'

Universities of Technology are leading the charge in closing the gap between academic research and the implementation of ideas into real-life business challenges.

If we grow R&D spending as promised then there is space to support world class, blue skies research and more applied, translational activity. If we want to improve productivity as well as wages and living standards through the whole of the UK, then we will have to do more than creating the conditions to win more Nobel prizes.

Universities of Technology are leading the charge in closing the gap between academic research and the implementation of ideas into real-life business challenges through knowledge exchange. They make sure that the diffusion of innovation is as relevant to a family run firm as it is to a huge world leading competitor. This additional focus of Universities of Technology on incremental improvement for SMEs rather than just disruption innovation has been described by Richard Jones as 'the underrated backbone of productivity growth.'[51]

This is backed up by this report's polling, which showed that only 16% of small businesses engage in a programme or event that supports SME growth. More investment and focus is needed to increase this level.[52]

[51] Richard A. L. Jones "A Resurgence of the Regions: rebuilding innovation capacity across the whole UK" ResurgenceRegionsRALJv22_5_19 (softmachines.org)
[52] See Appendix, Investment and R&D

Applied Research in Collaboration with Business: GreenSCIES

Despite the comparative lack of funding for applied research – this type of work does still take place in Universities of Technology across the UK, in close partnership with business. An example is GreenSCIES (Green Smart Community Integrated Energy System), a new low carbon smart energy grid developed by academics at LSBU, which aims to deliver low carbon and low-cost transport, power and heat to 12,500 homes in the London Borough of Islington and Sandwell in the West Midlands.

The energy grid will help reduce carbon emissions by an estimated 80% (against conventional systems) while addressing fuel poverty by significantly reducing consumer bills. GreenSCIES is a 'fifth-generation' energy network, which operates by capturing waste heat from secondary heat sources - including office buildings, data centres and the public transport network and then distributing it to homes and business, raising or lowering the temperature through heat pumps as required. With the Mayor of London's goal of ensuring that the Capital achieves zero-carbon status by 2050, this study is an important initiative to help power London's homes and businesses, cutting energy costs and reducing carbon emissions. Beyond the Capital it has potential applications wherever there are sources of unwanted or unused heat such as large data centres, industrial or mining operations.

The ground-breaking engineering science behind GreenSCIES was developed by an LSBU-led consortium of 16 business partners, including a number SMEs, with the support of Islington and Sandwell Councils, Transport for London and InnovateUK. Despite 99% of UK businesses being SMEs, there is a common assumption that universities only work with large corporations. GreenSCIES is an example of a university bringing together over a dozen small business enterprises to deliver a project with international potential. Applied research of this kind also plays a key role in enriching the teaching experience, ensuring that students are given up to the minute information, directly informed by the University's work with industry.

Through specialism and a local and regional focus, Universities of Technology such as Aston University and LSBU can both claim to be 'stickier' institutions

We already know that large amounts of human capital within a region leads to more rapid reinvention and long-term economic growth.[53] These empirical findings are explained by the fact that human capital increases individual-level productivity and idea generation.[54] Thus, by extension, a higher level of human capital within a region raises regional productivity. This report's survey found that over 60% of SMEs that this report spoke to recruited most of their graduates from their local area or region.[55]

However, Abel and Deitz went on to refine this through the idea that research and development is stickier and more important for local economic development because it binds ideas to places rather than just producing inherently mobile human capital.

> *Newly minted graduates directly raise the human capital level in a region if they remain in the area and enter the local labour market. However, because college graduates are highly mobile it is not obvious that regions producing more graduates will also have higher human capital levels as a complex set of labour supply and demand factors are at work.*[56]

Thus in this sense it is the 'spill over' effects that are of crucial importance with respect to increasing the demand for human capital and ensuing economic growth, whether it is produced locally or not.

These 'spill over' effects cannot be left completely to chance. Universities have a key role to ensure they continue to work with employers to create local absorptive capacity, so translational research has a thriving economy capable of utilising it. By developing this absorptive capacity, firms have the ability to turn innovation into products, services and good jobs, which in turn can also help ensure that the graduates that universities are producing don't leave for somewhere else.

Absorptive capacity depends not just on graduates that can immediately apply technical skills in any given sector, but also on the broader skills that enable businesses to plan new production or service strategies too. This means that the capacity should include business and management capability – in both skills and applied research – that business schools can offer.

[53] E. Glaeser, and A. Saiz (2004) "The Rise of the Skilled City," Brookings-Wharton Papers on Urban Affairs: 47-94.
[54] G. S. Becker, (1964) Human capital: a theoretical and empirical analysis, with special reference to education. New York: Colombia University Press.
[55] See Appendix, Recruitment
[56] Abel and Deitz; "The Role of Colleges and Universities in Building Local Human Capital" The Role of Colleges and Universities in Building Local Human Capital by Jaison R. Abel, Richard Deitz :: SSRN

Rugged Nature

All students at Aston University even those outside of Aston Business School have the opportunity to learn practical entrepreneurial skills. Students across the university are also encouraged to take a placement year to get a better understanding of the commercial world, build their professional skills and boost their employability. The Birmingham Skills for Enterprise and Employability Network (BSEEN) incubator programme led by Aston University offers students and recent graduates a twelve-month package of start-up support to launch new ventures. Participants benefit from a variety of workshops during a 5-day bootcamp, networking opportunities, tailored mentoring, grants, and workspace from idea to launch and beyond.

With the support of the Aston Enterprise team, Aston University student Joe Poxon developed Rugged Nature, a natural male grooming company, during his placement year. He went on to win the Aston Enterprise pitching competition in 2020, receiving seed funding for the business, and successfully applied for an Enterprise bursary. Joe is now developing his business further and has joined other early-stage entrepreneurs on the Aston Programme for Small Business Growth for the next stage of the growth of his business.

Management training and business schools as convening spaces and research centres are also crucial

John Van Reenan has drawn attention to the fact that variation in management practices accounts for nearly a quarter of the roughly 30% productivity gap between the US and Europe.[57] This is due to competent management being a basic capability that, if not effective, is a limiting factor for the success of any business. His findings showed that 'large, persistent gaps in basic managerial practices were associated with large, persistent differences in firm performance.'[58] His research further suggested that improvements in management practices can reinforce the benefits of any skill improvements in their workforce, and that better managed firms spent ten times as much on research and development suggesting that 'they were not sacrificing innovation to efficiency.'[59]

There is still a long way to go. It is clear that many SMEs still underestimate the value of good management practices in achieving success. Research from the report's poll found that when anticipating additional training needs over the next few years, the most popular were specialist skills focusing on knowledge accumulation such as digital or technical skills as opposed to leadership and management

[57] N. Bloom et. al., "Management practices across firms and countries" (2012) Microsoft Word - Bloom_final_APM.doc (nber.org)
[58] Harvard Business Review, Why Do We Undervalue Competent Management? (hbr.org)
[59] Ibid

skills that are more to do with how you utilise these skills. However, 82% of larger businesses anticipated their business needing additional training for leadership and management skills, compared to an average of 33% across the sample.

Business schools therefore offer an important capacity and key area of expertise sitting alongside specialist capabilities such as manufacturing/engineering, construction or digital technologies. Management in this sense can be thought of as not just a skill that is taught and used but an active ingredient for applying research and supporting local, regional and sectoral growth.

Majestic and Aston – a Knowledge Transfer Partnership

A Knowledge Transfer Partnership (KTP) is a programme that helps businesses improve competitiveness and productivity by connecting them to academic resources, technology, and skills within a university. KTP is a 3-way partnership between a company, Aston University and a suitably trained KTP Associate who works within the business to increase the company's capabilities and profits.

Organisations of all sizes and from all sectors are eligible to participate, as are public funded organisations, charities and businesses from the not-for-profit sector. Aston University works with a diverse range of companies across various sectors - technology, software, manufacturing, pharmaceuticals, medical technologies, business and many more.

Aston University is one of the country's leading institutions by number of active KTPs. One of the businesses it is currently working with is Majestic, a world leader in distributed web crawling. The company based in Birmingham is working with Aston University with an aim to introduce a suite of new innovative big data analysis tools, which can then be sold commercially. The work is mutually beneficial to both parties, enabling the business to develop, supporting Aston University to deliver on its mission to grow regional SMEs through impactful research and providing opportunities for new research trajectories and student projects.

Chapter 3: Joining up the two missing middles

Linking Technical Education to Applied Research

This must start now. The OBR is predicting the worst recession for 300 years. Joining up the two missing middles of skills and research will support us in tackling unemployment - including among graduates - rebuilding sectors and individual firms, renewing confidence in cities and retraining adults. There is a lot to do. The White Paper, however, was near silent on this. But thinking more broadly about R&D, recovery, geography, and productivity allows more expansive thinking about the different complementary roles and strengths of universities and colleges alongside employers, local government and other important players. It is therefore vital that any reforms to the tertiary system, post-Augar, understand and act on this.

Both government and those who are leading universities should be looking to unlock the benefits of bringing together several agendas to help recovery from Covid-19 and to boost local and national productivity.

Both government and those who are leading universities should be looking to unlock the benefits of bringing together several agendas to help recovery from Covid-19 and to boost local and national productivity. Along the way this can also drive local innovation, economic growth and job creation. But it will depend on greater and broader investment – from both business and government – as well as on institutions that understand and can deliver it in practice. That means reinventing and supporting universities that can acquire and apply knowledge, especially in the context of particular places and sectors. These are institutions as this report has argued like LSBU and Aston University that can join up and fill both 'missing middles'.

Reaching out to local businesses

Many Universities of Technology undertake outreach work and collaborate with smaller local businesses that may not otherwise think to engage with a higher education institution.

LSBU has worked with over 10,000 small and medium-sized enterprises, as part of its £29 million business support programme portfolio, with a quarter of these receiving 12 or more hours of face-to-face support. The University uses a multi-faceted recruitment strategy to reach these SMEs including: workshops and drop-in sessions; working in collaboration with local councils and business improvement districts (BIDs); working in partnership with other higher and further education institutions; and creating 'quid pro quo' relationships with shared workspaces and business hubs to deliver business education on site in return for access to members.

The University is also the leading higher education provider of ERDF-funded business and innovation support programmes in London. To date, the University has secured more than £11 million of ERDF funding while contributing £6 million in match funding. LSBU is currently delivering seven programmes covering a diverse range of sectors including health tech, low carbon and food tech. Over the next three years, these will support around 1000 local SMEs, create 140 jobs and bring over 180 new products and services to market.

Towards a framework for levelling-up and building back better

If, as a country, we want R&D to help address our overarching stagnation in productivity and its contribution of spatial inequality, we must consider how to increase our capacity for applied research as well as where this might be most usefully supported in order to 'level up' underperforming places.

As a report from NESTA, *The Missing £4 billion* illustrated:

> *The UK's science base has not been effective enough as a driver of economic growth and national well-being. There is much that is excellent about it; it performs very well for its size, particularly as measured by conventional academic measures like citations. But it suffers from three shortcomings. Its overall scale is too small for an economy of the UK's size, it is relatively weak in translational research and industrial R&D, and it is too geographically concentrated in already prosperous parts of the country which are often at a distance from where business conducts R&D.*[61]

According to the Industrial Strategy Council (which, unfortunately, was disbanded in March), the principal drivers of regional differences in productivity-relevant characteristics can be grouped into four categories:

- Workforce attributes: skills, motivation and health of the workforce that a place is able to attract or retain
- Capital and infrastructure: the machinery, equipment and infrastructure which supports work in a given location
- Geography and local institutions: inherent characteristics of a location which may be conducive to economic activity, such its location (coastal or inland, remote or central) or local culture
- Sectoral specialisation: refers to the composition of economic activity which takes place in a given location.[62]

[61] Forth and Jones, "The Missing £4 Billion" Nesta, 2020 The Missing £4 Billion: Making R&D work for the whole UK (nesta.org.uk)
[62] Zymek and Jones, 'UK Regional Productivity Differences: An Evidence Review' (February 2020). UK Regional Productivity Differences: An Evidence Review (industrialstrategycouncil.org)

This gives us an important framework for what must be supported in successful places and improved in those parts of the country that are developing but lagging behind. It is intended to be a roadmap for policy, and in the case of technical, applied universities rooted in their places and specialist sectors it is especially significant.

As argued in the NESTA report:

> *Imbalanced investment in R&D is, at most, only part of why the UK's regional economic divides widened in the past and have failed to close in recent decades. But it is a factor that the Government can influence.*[63]

David Sainsbury in his book *The Windows of Opportunity* went further to describe what levers the Government has to foster a high innovation high productivity economy. He argues that there are four possible strategies to increase innovation: leave it to the market; support the supply of relevant factors of production; support key industries and technologies; and pick specific firms/technologies/products.[64] He argues that the role of government should be focused on the middle two through funding science and skills, and through an industrial strategy promoting vital industries and technologies. This report argues that the support for key industries and technologies must have place at its heart.

Misallocation of complementary investments

Economists studying the UK's productivity problem acknowledge that we must better develop and support key institutions as well as addressing the disconnection between agendas and departments in government. Bart Van Ark and Tony Venables, leaders of the new UKRI/ESRC Productivity Institute, described this as a problem of spatial centralisation and functional fragmentation:

> *Many policy initiatives suffer from over-centralisation, top-downism, short-termism linked to the electoral cycle, silos and the absence of effective joined-up government, as well as lack of meaningful engagement with stakeholders (both governmental and non-governmental) beyond Westminster and Whitehall, and a disjointed, constantly changing approach to both policymaking and policy-delivery.*

To spread the economic benefits of innovation across the UK, this report argues we need change. Not just through more skills, or more research, or even a replacement industrial strategy but through a fundamental joining up of all these currently separate parts. This, as Forth and Jones called for, will need to include:

> *a commitment to greater transparency on how funding decisions are made in the Government's existing research funding agencies, an openness to a broader range of views on how this might change and devolution of innovation funding at a sufficient scale to achieve a better fit with local opportunities.*[65]

Bringing together several agendas

The uplift to 2.4% therefore provides the opportunity to radically alter the way we look at research funding in this country. Local accountability will be key to bringing forward the Government's levelling-up agenda. As we move to a funding landscape that includes many new sources there will be a need to coordinate these funding decisions to ensure the greatest economic and social benefits. This report welcomes the news that UKRI and BEIS will develop a place-based strategy towards future R&D but it remains the case that Universities of Technology working closely with business will be key to bringing these agendas together.

As ground-breaking research from Switzerland has shown, it is Universities of Technology that through their innovation and invention, could be the key to levelling-up.[66] In the mid-1990s, a Swiss policy intervention saw the establishment of a swathe of Universities of Applied Sciences (UASs). These were mandated to focus their research and teaching on applied knowledge and science and in doing so to collaborate with firms; and they had at their heart a focus on translational research. These institutions increased both the quantity of regional innovation and its quality. The report argues that due to the increased technical knowledge in the regions surrounding these UASs, the private and crucially the social value of patents increased. In this way their results show that the establishment of the applied research institutions helped foster innovation outside the normal concentrations by spreading innovation through SMEs.[67]

Modern Universities of Technology like Aston University and LSBU are centred on the creation and enhancement of technology (in the broadest sense of the term); and on using it to the greatest effect in the growth of enterprises and enhanced productivity which are key to unlocking the UK's longstanding productivity puzzle. Institutions like this are often the biggest sources of innovation and investment in their areas and as this report has shown are working to make these research and skills more 'sticky' by working with local businesses to create more absorptive capacity.

As this report has argued, institutions such as Aston University and LSBU are ready to play their part, joining up not only the two missing middles but also as anchor institutions in their communities connecting many place-based agendas and through it delivering tangible economic and social benefits.

[63] Forth and Jones, "The Missing £4 Billion" Nesta, 2020 The Missing £4 Billion: Making R&D work for the whole UK (nesta.org.uk)
[64] Financial Times, https://www.ft.com/content/2,17f6d28-5a3e-48e0-bf6e-c2618da8f34b (21st February 2021)

[65] Forth and Jones, "The Missing £4 Billion" Nesta, 2020 The Missing £4 Billion: Making R&D work for the whole UK (nesta.org.uk)
[66] SERI, "Regional Innovation Effects of Applied Research Institutes" (2021) 0117_Ihwpaper.pdf (uzh.ch)
[67] Ibid

Appendix: Summary of results of SME polling commissioned for this report

On behalf of London South Bank and Aston Universities, Public First conducted an online poll among 251 senior decision makers from SMEs, ranging from sole traders to companies with up to 250 employees. The survey was conducted from 13th-19th January 2021. Public First is a member of the British Polling Council and abides by its rules. For more details, go to www.publicfirst.co.uk.

Functions of a university

- The survey started by listing various functions of a university, such as supporting businesses, advancing academic disciplines and upskilling adults, and asking respondents which functions they thought universities should do more or less of.
  - The most popular answers for what functions universities should do more/much more of were 'prepare young people for careers' (77%) and 'upskill or retrain adults' (72%).
- Respondents were more likely to want universities to do more work than they currently do in training people than they were to want universities to do more to work than they currently do with local businesses.
  - 77% of respondents said that universities should do more/much more to 'prepare young people for careers'.
  - 60% of respondents said that universities should do more/much more to 'work with local businesses to support them to grow'.
  - 62% of respondents said that universities should do more/much more to 'work with local businesses to improve efficiency through new capabilities or processes'.
- Respondents were least likely to want universities to do more of their 'traditional' academic functions, such as advancing academic disciplines and conducting theoretical research.
  - 51% of respondents said that universities should do more/much more to 'advance academic disciplines'.
  - 44% of respondents said that universities should do more/much more to 'conduct theoretical research'.
- Smaller businesses (<10 employees) tended to be more likely to want to see universities do more career orientated education than their larger counterparts (10-250 employees). Smaller businesses (73%) were more likely to want universities to do more/much more upskilling/training for adults than large businesses (67%). Smaller businesses (77%) were also more likely to want universities to do more/much more to prepare young people for careers than larger businesses (70%). This indicates that universities have a lot of potential value to smaller businesses, who are less able to conduct training in house.
- Larger and smaller businesses are equally likely to want more/much more support for businesses, but larger businesses (66%) were more likely to want to see more/much more application of research and innovation into the economy than their smaller counterparts (60%). This is most likely because they have the capacity to use it.

- Respondents who felt that their businesses had been impacted negatively by Covid (59%) were less likely to want more/much more help from universities for improving their efficiency compared to respondents whose business had not been impacted or were positively impacted by Covid (69%). It is possible that some businesses may still see collaboration with universities as a luxury, that is abandoned during hard times, such as when they are negatively impacted by Covid.
- Respondents who went to university were more likely to want universities to do more/much more to upskill and retrain adults than respondents who did not go to university.
  - 81% of respondents who went to university themselves wanted universities to do more/much more to upskill and retrain adults.
  - 65% of respondents who had not gone to universities themselves wanted universities to do more/much more to upskill and retrain adults.
- Respondents who went to university were also far more likely to want universities to do more/much more to introduce innovations into the economy than respondents who did not go to university.
  - 64% of respondents who went to university themselves wanted universities to do more/much more to introduce innovations into the economy.
  - 28% of respondents who had not gone to universities themselves wanted universities to do more/much more to introduce innovations into the economy.
- These differences in expectation of universities between those who had and had not attended universities themselves could have occurred because those with experience of university life were more likely to be aware of the full range of services that universities offer and want to see more of those services expanded.
- Indicatively, it seems newer businesses (<2 years old) may be more likely to want to see more support from universities than older business (>2 years old). Newer businesses (79%) were more likely to want universities to do more/much more to work with business to improve efficiency' than older business (59%). Similarly, newer businesses (70%) were more likely to want universities to do more/much more to 'work with businesses to help them grow' than older businesses (58%). However, it must be emphasised that these results are indicative, and a large sample size is required to confirm these finding around the age of business and correlation to desire for support.

Engagement with universities

- Respondents were asked if they had engaged with a university on a personal or professional basis in the last three years. Of respondents, 21% had engaged with a university on a personal basis, while 12% had engaged on a professional level.
- Of those who had engaged with a university on a personal level, 82% had found it somewhat or very beneficial. Indicatively, 74% of those who had engaged with a university on a professional level had found it useful, however, the sample size is too small to draw firm conclusions.
- There was no significant difference in likelihood to have engaged with a university as a business in the last three years between those who had and had not been to university themselves. However, smaller businesses (9%) were much less likely to have engaged with a university than larger businesses (38%).

- Indicatively, it seems that businesses were most likely to engage with universities for recruitment, but the sample size is too small to make any firm conclusions.
- Indicatively, it seems that businesses who had engaged with a university in the last three years were much more likely to spend on R&D as a company. 53% of companies who had not engaged with a university in the last three years had spent 0% of revenue on R&D, compared to only 14% of those who had engaged with a university. However, it must be emphasised that these results are indicative, and more polling must be done to test this finding.

Recruitment

- Respondents were asked how many graduates they hired in a typical year. 83% of respondents hired no graduates at all, with this figure dropping to 32% of larger companies (over 10 employees) hiring no graduates in a typical year.
- The survey found that over 60% of SMEs recruit most of their graduates from their local area or region.
  - 30% of respondents claimed that most of their graduates came from their local area.
  - 31% of respondents claimed that most of their graduates came from their local region.
- 25% of respondents found it difficult or very difficult to find highly skilled workers, this rose to 40% when sole traders were excluded from the sample.
- Respondents found it harder to find senior highly skilled workers than junior highly skilled workers.
  - 14% of respondents found it difficult or very difficult to find highly skilled workers in junior roles, this rose to 21% when sole traders were excluded from the sample.
  - 18% of respondents found it difficult or very difficult to find highly skilled workers in mid ranking roles, this rose to 28% when sole traders were excluded from the sample.
  - 30% of respondents found it difficult or very difficult to find highly skilled workers in senior roles, this rose to 51% when sole traders were excluded from the sample.

Upskilling/training: planning

- Respondents were asked about their businesses' approach to training and upskilling of their current workforce.
- Only 20% of respondents had a formal training plan for their business, rising to 32% when sole traders were excluded from the sample.
- Only 24% of respondents spent more than 5% of their labour costs on training, rising to 37% when sole traders were excluded from the sample.
- 61% of respondents thought they invest the right amount, with 19% thinking they don't invest enough. The proportion of respondents who thought they did not invest enough rises to 28% when sole traders were excluded from the sample.
- Respondents were asked what the main barriers were to investing in training for their workforce. The factors most commonly identified as barriers to investing in training were a lack of time to disrupt production/service and a lack of time to focus on finding the right training.
  - 35% of respondents felt a lack of time to disrupt their production/services was a barrier to investing in training.
  - 25% of respondents felt a lack of time to focus on finding the right training was a barrier to investing in training.
  - 21% of respondents felt that recruits already had the skills they needed.
  - 18% of respondents felt there was no appropriate training available to them.
- The least popular response was that employers were worried they may lose their employee after providing training (9%).
- In general, businesses do not find it difficult to know about training opportunities, with only 14% of respondents finding it difficult, compared to 33% that found it easy. 38% of respondents found it neither easy nor difficult to know about training opportunities, while a further 15% responded 'don't know'.

Upskilling/training: needs and participation

- Respondents were asked what additional training needs they anticipated their business having over the next 12 months. The most popular responses were digital skills (53%), technical skills (45%) and financial skills (which could be interpreted as management skills) (43%). The least popular responses were basic numeracy and literacy (21%), interpersonal (33%) and leadership and management (33%).
- A higher proportion of larger businesses (>10 employees) anticipated additional training needs over the next 12 months. Larger businesses were more likely to report additional training needs for digital skills, technical skills, financial skills and leadership and management skills.
  - 68% of larger businesses anticipated their business needing additional training for digital skills, compared to an average of 53% across the sample.
  - 74% of larger businesses anticipated their business needing additional training for technical skills, compared to an average of 45% across the sample.
  - 82% of larger businesses anticipated their business needing additional training for leadership and management skills, compared to an average of 33% across the sample. This is likely due to the increasing importance of management and leadership as the number of employees grows.
- Respondents were also asked whether any of their employees participated in certain types of training in the past three years. Here, by far the most popular answer was technical skills, in which 41% of respondents had employees participating in training. Aside from basic literacy and numeracy (16%), an average of 21-26% of respondents sent employees to training in the other categories.
- Larger businesses were far more likely to have had some of their employees participate in training in the past three years. This is particularly true of training for technical skills and digital skills.
  - 70% of larger employers had some of their employees participate in technical skills training over the last 3 years, compared to the 41% average across the sample.

  - 59% of larger employers had some of their employees participate in digital skills training over the last 3 years, compared to the 26% average across the sample.
- For all types of training, a lower proportion of respondents reported having employees participating in training in the past three years than they anticipated having additional training needs in the next twelve months.

Upskilling/training: delivery

- For respondents who had employees participate in training in the past three years, they were asked how the training was provided. For most types of training, this training was delivered in roughly equal proportions in house and by external training providers. The exceptions to this were interpersonal skills (59% delivered in house compared to 35% external provider), leadership and management (44% in house compared to 55% external), and basic literacy and numeracy (74% delivered in house compared to 22% external provider).
  - Universities delivered between 3-10% of training, depending on the category. The least popular types of training for university participation were digital skills (3%) and technical skills (5%), compared to the most popular, which were interpersonal skills (10%) and leadership and management skills (9%).
- Training is almost unanimously seen as beneficial, with between 90% and 97% of respondents finding training somewhat or very beneficial, depending on the type of training. The sample size is too small to analyse even on an indicative basis how beneficial training was found to be for each type of training provider.

Investment and R&D

- Only 16% of respondents had engaged in any programme or event that supported SME growth.
- Respondents were asked what percentage of their revenue they spent on investments. The vast majority (68%) spent less than 10% of their revenue of investment, with 21% spending 0%. Of companies that had over 10 employees, only 2% spent 0% of their revenue on investment.
- Respondents were also asked what percentage of their revenue they spent on R&D specifically. Very few companies invested significant amounts in R&D, although larger companies were more likely to invest in R&D.
  - 48% of respondents reported spending 0% of their revenue on R&D, with a further 25% spending less than 5% of their revenue on R&D.
  - For companies with over 10 employees, only 13% spent 0% of their revenue on R&D.
- For those companies that did invest in R&D, they tended to conduct that R&D in house. 81% of respondents who invested in R&D spent a portion of their investment in house, compared to only 21% using external research providers and 6% using universities.
- The most popular types of R&D that respondents participated in were developing an existing product or service (45%) and developing a new product or service (44%), with the least common responses being research into competitors (21%) and developing new business processes or capabilities (24%).
- For those who did invest in R&D, 92% found it somewhat or very beneficial.

Quotas, Weighting and Cross breaks

- A quota was established so that 50% of respondents were from the West Midlands, and 50% were from London. The data was weighted to reflect the profile of businesses in London and the West Midlands.
- When analysing cross breaks and survey responses, only responses with a base size of over 80 respondents were reported on. Any responses with fewer than 80 pre-weighted respondents have been labelled as indicative results, from which meaningful conclusions cannot be drawn.