

ENGINEERING PROFESSORS' COUNCIL BRIEFING

ENGINEERING OPPORTUNITY

Maximising the opportunities for social mobility
from studying Engineering

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Engineering Professors
COUNCIL

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ENGINEERING OPPORTUNITY

Maximising the opportunities for social mobility from studying Engineering

PREFACE

THE GOAL of engineering is to solve human problems and so it is fitting that we should consider whether the study of Engineering itself helps to solve the problem of social injustice for graduates from lower socioeconomic backgrounds.

This paper examines that important question and, gratifyingly, we have found clear evidence that Engineering makes a significant contribution to social justice for its graduates – perhaps to a greater extent than almost any other discipline in higher education.

We have also explored what we – as Engineering academics, as institutions of learning and as a wider society – can do to amplify that social impact.

Among our recommendations we could have called for better careers education, information, advice and guidance. We could have called for greater numbers of better qualified teachers in Maths, Physics, Design & Technology (D&T). We could have called for more resources for these gateway subjects. And we could even have called for Engineering to be recognised in the school

curriculum either as its own subject or through the overhaul of D&T as Engineering, Design & Technology.

We could have made these recommendations, because it is abundantly clear they would make an important difference and the extent to which they have been overlooked is a critical part of the challenge.

However, in true engineering style, we have chosen to focus our recommendations on steps that are suggested by the evidence we have examined. We have proposed practical and immediate changes that would have an impact far beyond the scale of their implementation.

Aspiration among young people is not lacking, but opportunity is. Our research shows that studying Engineering provides that opportunity and what we need to build is a system – through education and into employment – that maximises those opportunities for all who want to realise their potential.

Johnny Rich
Chief Executive

RECOMMENDATIONS

Wider access to Triple Science and Maths

Every student with the capacity to succeed should have the opportunity to study Triple Science until GCSE (or other Level 2 equivalent) and Maths to A-Level or equivalent. Access should not be circumscribed by the availability of teachers or by schools or colleges having incentives to limit those courses only to the most able. This will have resource implications, but in terms of national priorities in social justice and economic benefit, it is an investment with huge returns.

Adopt a more radical approach to contextual admissions with added support

We need an admissions process that encourages aspirations and provides the opportunity to realise them by considering applicants as individuals. Traditional Level 3 qualifications are an imperfect indicator of attainment and still less of aptitude. For the purposes of Engineering, they are not even a good indicator that applicants have gained the foundational knowledge they will need to acquire.

A more radical approach to contextual admissions should actively facilitate applications from candidates from lower socio-economic backgrounds who do not have the traditional qualifications for Engineering, particularly Physics or Maths A-level, and Triple Science GCSEs.

This *must be* coupled with extra support (especially in Maths) to those students before they embark on Engineering degrees, during their transition to study and throughout. This should include intensive summer schools before university and complementary study programmes alongside the core degree modules. Students' and academics' workload will need to be adjusted to avoid overload.

Preadjusted tariffs

The Office for Students (OfS) and UCAS should explore instituting a system of tariffs, based not only on the absolute grades and qualifications achieved, but adjusted according to contextual data. This would support a fairer, system-wide approach to contextual admissions, levelling the playing field between candidates and among institutions.

Expand Foundation courses

Foundation courses are a proven access route to Engineering higher education. The funding regimes across the UK should incentivise their expansion, but, even in the absence of additional funding, universities should regard foundation courses as an important component in their access and participation activity and promote them accordingly.

Foundation courses, ideally with minimal procedural transition into degree study, are more effective than other access courses because the continuity of study in the same institution supports progression.

That said, the current focus on continuation data as a performance metric discourages universities from offering programmes that provide smooth transition because progression through to a full degree is always likely to be lower than progression *within* a degree programme. Similarly, progression from BEng to Masters compares unfavourably with those who enrol in and complete MEng programmes. This needs to be considered in performance metrics (see below).

Develop conversion courses

The opportunities for social mobility provided by a qualification and/or career in Engineering should not be restricted to school-leavers. Particularly as we look toward recovery from the Covid-19 pandemic, there are many people with more life experience and qualifications in other areas that would benefit from being able to retrain as engineers, which is a sector with severe skills shortages.

Alongside the support that is needed to facilitate enhanced contextual admissions, higher education providers should develop nationally recognised, Level 3 preparatory courses (with a particular focus on part-time) for experienced individuals from other fields to embark on a programme of Engineering higher education. The Government should provide financial incentives to students to join these programmes, particularly to the unemployed, in a similar way to its support for the Kickstart Scheme, but with an age restriction of under 40.

Metrics that help, not hinder

Universities' strategies and behaviours are influenced by the metrics by which they are judged and the consequences attached to those judgements. The Government, OfS and other UK regulatory bodies should adopt criteria for success that better recognise the distance travelled in terms of achievement for students who reach degree standard from a lower base of prior attainment and in the face of greater challenges.

We recommend developing progress measures that appraise skills on entry to higher education and reassessment at the end. This would help to identify gaps in understanding and quantify learning gain.

In order to promote the 'levelling up' of deprived communities, the criteria must also recognise geographic variability and not create metric incentives that mean that social mobility is only recognised when graduates move away from communities that need their skills and innovation. No university based in a low employment area and recruiting local students should be metrically punished because its graduates do not move away. We recommend that employment outcome data should always be regionally benchmarked.

By using data that does not recognise learning gain or geographic variability, the Government and regulators effectively promote the use of these poor proxy measures by league tables and applicants in judging what constitutes a 'good' university or course. This actively undermines progress in promoting social mobility.

As well as abandoning harmful metric approaches, the Government and regulators should seek to provide better alternatives by developing commonly used indicators that recognise social mobility and which can track progress through schools, colleges, higher education and into the labour market. To this end, particularly in the context of Engineering, there will need to be a better understanding of what constitutes a 'graduate role'.

Monitor access on a discipline level

Through the lens of POLAR data, Engineering courses perform disappointingly when it comes to fair access. In an effort to improve access metrics, universities may be encouraged to cut Engineering courses rather than address the access challenges. This would be counterproductive given the social mobility opportunity that Engineering courses provide. Regulatory regimes – such as Access & Participation Plans and performance metrics – need to be benchmarked at discipline level in order to reward courses that provide pathways to professional work.

WHAT IS SOCIAL MOBILITY?

SOCIAL MOBILITY is the movement of people within society between different relative social positions or classes and is normally discussed in relation to improving social position (Miller, 1960).

The study of social mobility has often focused on how easy it is for people within a country or boundary to be socially mobile, making it distinct, but heavily related to geographic mobility (Messner and Rosenfeld, 2006).

There are two types of social mobility: absolute and relative. Absolute mobility refers to changes within entire societies or groups within a society, seen through actions such as increased living standards, or decreasing inequality between classes (Byrne, 2009).

Relative mobility differs, as it looks at individual people or households moving within social hierarchy, for example through these people accessing better education, without any structure changes occurring within society (*ibid*).

While social mobility is an attractive prospect, many people face systematic barriers that limit their access to mobility, with access to education, and in particular higher education being a limiting factor for social mobility due to uneven access across the UK (Major and Banerjee, 2019). Because of this, higher education has frequently been addressed in policy as key to promoting social mobility in the UK and numerous reports have made policy suggestions to make higher education more accessible (see Major and Banerjee, 2019 or Milburn, 2012).

This report aims to join this conversation about higher education and social mobility through investigating the variability in graduate earnings to identify student characteristics which might, through studying Engineering, be levellers and therefore consider whether changes to Engineering HE policies can aid relative mobility.

Fifteen months after leaving university, 82% of Engineering graduates are in highly skilled roles and, after ten years, they earn an average of nearly £12,000 more than other graduates.

‘Social justice’ or ‘social mobility’?

The term ‘social mobility’ is often assumed to imply a direction of upward travel that suggests an improvement of the person, rather than merely of their social status. In using this terminology, we do not intend to make any such inference. When we refer to ‘social mobility’, we are referring to the equal opportunity of individuals to alter the circumstances of their birth fairly and as they might wish. In other words, this paper is about achieving social justice and equality through the opportunities for mobility and self-determination.

HOW DOES ENGINEERING BENEFIT SOCIAL MOBILITY?

IN TERMS OF salaries and career outcomes, studying Engineering at university benefits graduates significantly. They earn higher salaries and a greater proportion are in highly skilled jobs than the average for all subjects.

Engineering graduates earn a median salary of £42,700 ten years after graduation (LEO, 2020).

This increased salary for Engineering graduates is seen soon after graduation, with Engineering graduates earning a median of £6,200 greater than the median for all subjects one year after graduation (LEO, 2020). This difference continues to grow at an increasing pace as time since graduation increases, with Engineering graduates earning £11,700 more than the median for all university subjects combined ten years after graduation (LEO, 2020). This is illustrated starkly in figure 1 opposite).

It is important not to confuse high salaries with social mobility. Although there is an obvious correlation, income is an unreliable indicator of class, social position or self-determination, particularly if considered outside regional contexts. A relatively high salary in national terms may be relatively modest in a high-cost area of the country such as London, while the reverse is true in other regions.

Ideally income should be just one measure of social mobility. The skills level of employment roles should be another (although this data is open to subjectivity). Other measures might also be included. However, there is no readily available metric of social mobility and so we have used salary as a proxy, acknowledging the critical limitations.

That said, the salary premium for Engineering graduates does provide them with greater security and, potentially, the means to social mobility.

On this measure, Engineering compares favourably not just against all subjects, but also in comparison with, say, Computing (+£3,900 and +£2,500 median after 1 and 10 years respectively)

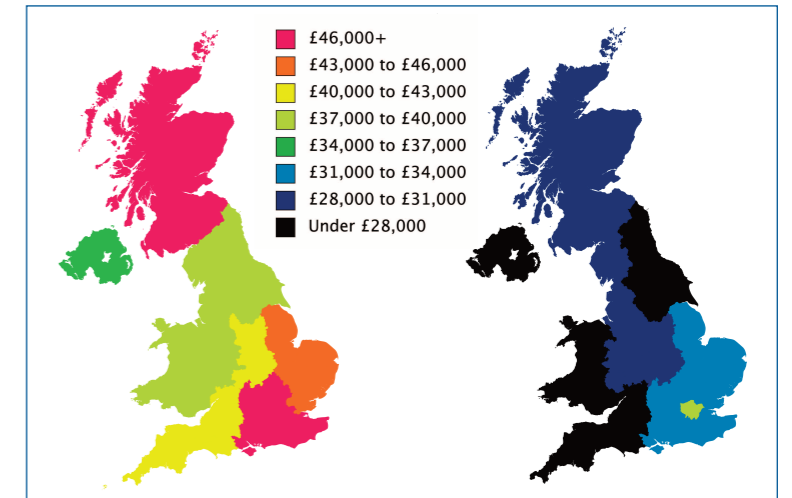


Figure 1: Median salaries for Engineering graduates (left) and all graduates (right). Source: LEO, 2020

and Biosciences (+£8,000 and +£11,300 median, respectively). Only Medicine & Dentistry and Economics attract greater median salaries overall, making engineers the third highest earners by discipline.

Furthermore, while 76% of all university graduates are working in highly skilled industries 15 months after graduation, this number is greater for Engineering graduates at 82%, and for Engineering graduates from full-time courses, it is higher still at 85% (HESA, 2020).

With a large proportion of Engineering graduates working in highly skilled fields, salaries for graduates increase and opportunities are opened up, allowing for greater mobility. Highly skilled Engineering graduates earn the third highest median salary (£28,000) across the science subjects 15 months after graduation, behind Medicine & Dentistry and Veterinary Science (HESA, 2020).

Moreover 65% of Engineering graduates are likely to be in full-time employment 15 months after graduation which outstrips the average for all subjects at 59% (HESA, 2020).

Consequently, studying Engineering is a likely precursor to social mobility, as it provides good career prospects, employment opportunities and high salaries.

WHAT IS THE ISSUE?

EVEN THOUGH studying Engineering provides the promise of social mobility, there remain large inequalities that make access to that promise hardest for those who have the most to gain - the most vulnerable and disadvantaged groups.

This issue is discussed in this paper in relation to two issues: prior attainment and geographical variability.

Access to university places, on average, varies substantially according to the level of parental income and students from poorer families access different types of universities to those from wealthier backgrounds. (Vignoles et al., 2016). Moreover, previous research has shown that most of the difference in access to HE by socioeconomic background is explained by higher prior academic attainment among more affluent students (Chowdry et al., 2012; Croxford and Raffe, 2013).

In recent years, the introduction of LEO data has enabled the study of variability in graduate earnings and a value-added measure of degree subjects. For example, Vignoles et al showed that Engineering graduates earn significantly more than those from other subjects, even after student intake characteristics (such as age, region and parental income) - and the fact that Engineering tends to be studied at higher tariff institutions - were considered.

This means that Engineering graduates' higher earnings can be only partly explained by their pre-existing characteristics that associate with higher earnings. Choosing to study Engineering in HE really does increase labour market success, one of the drivers of social mobility.

However, despite an acknowledged focus on students who are high-achievers, given that over 50% of Engineering graduates achieved more than 300 (120 New Tariff) UCAS points (i.e. 3 A levels at BBB) (LEO, 2020), we see a particular emphasis on those who have A-Level mathematics. Although this is often cited as a prerequisite due to the skills required to study Engineering, this systematically

removes students unable to obtain high grades or mathematics due to factors external to the discipline of Engineering. This effectively limits the scope of social mobility in Engineering by removing some of the students who would benefit most from study.

Choosing to study Engineering really does increase labour market success, one of the drivers of social mobility.

Secondly, just 9.6% of Engineering students come from local areas where participation in HE is lowest (POLAR quintile 1), compared to over 12.4% of students across all university subjects (Bullough, 2019). The POLAR participation quintiles are often used as an indicator of educational deprivation (HEFCE, 2012) and the lack of representation of these students in Engineering suggests greater interventions are needed for Engineering to better promote opportunities in these areas. It is a particular concern that, while the lowest quintile students are less likely to be accepted to Engineering than to other subjects, the application rates difference is less pronounced (UCAS, 2018, see Figure 3).

Combined with large differences in wages after graduation based on region within the UK (LEO, 2020), it remains difficult for some people to access the social mobility Engineering could provide.

Thirdly, the above barriers are compounded by the well-established gender gap in Engineering: just 19.1% of Engineering first year students in 2018/19 were female (HESA, 2020). While female engineers do succeed at university, gaining a higher rate of first-class degrees than male students, after graduation an earnings gap is apparent. The gender pay gap is as large as it is in Medicine, rising from £1,000 one year after graduation to £7,600 after ten years (HESA, 2020).

This income gap suggests that gender is an important variant in social mobility in Engineering, bearing in mind that research shows that student intake characteristics account for some, but not all, of the gender gap in Engineering earnings (Vignoles et al. (2016)).

This briefing paper aims to discuss these disparities within Engineering to provide evidence-based policy recommendations on the issues of **prior attainment** and **geographic variability** to maximise the power of Engineering to act as an agent of social mobility, rather than compounding structural inequalities within Engineering admissions, study, and graduate outcomes.

We have focused on traditional Engineering higher education pathways only for the purposes of this paper. However this work could be extended to explore other routes into Engineering, such as apprenticeships or information on support provided by schools.

Data Sources

We have predominantly used three data sets: the Higher Education Statistics Agency's (HESA) graduate outcomes publication from 2020 (for 2018/19); the Longitudinal Education Outcomes (LEO) data from the Department of Education and the Office for Students from 2020 (for 2017/18); and bespoke University of Liverpool analysis of HESA data (for 2014/15).

These data sets cannot be said to measure social mobility directly, but rather they act as imperfect proxies to allow us to understand some of the processes of mobility within the UK. Alternative proxies of general mobility could include social background or free school meals (see Gov.uk, 2015). However, our chosen data sets provide more detail about the impact of studying Engineering at university.

The HESA data set provides graduate outcomes 15 months after graduation to allow time for graduates to secure employment. The data are collected using a centralised survey given to all higher education providers in the UK, which then provide the survey to graduates (HESA, 2020). The target response rate for these surveys is 60% of UK-domiciled full-time students. Engineering is grouped under the umbrella discipline of 'Engineering and Technology'.

The LEO data that we have used is collected 1, 3, 5 and 10 years after graduation and is derived from tax and benefits records alongside student loans. This means that graduates do not play an active part in data collection. The LEO data set focuses on the financial gain from university and does not provide comprehensive data, with many important cohorts of students omitted from the data due to issues such as moving abroad - a group which is likely to include a large proportion of Engineering graduates. LEO data do not group Engineering as a discipline with any other subjects, meaning all data relate specifically to 'Engineering'.

The research analysis of HESA qualifications and information we have used links a bespoke student demographic dataset with a detailed data set on entry qualifications to understand their impact on admissions, progression and award. This was presented by Prof Tim Bullough to the EPC Recruitment and Admissions Forum in November 2019.

By using a range of sources, it is hoped that this research provides a summary of data and issues with reduced bias. However, it is important to recognise inevitable data limitations.

PRIOR ATTAINMENT

AS A PROFESSION, Engineering provides financial stability and mobility for those who are able to access degrees and careers in this field.

However, some students are excluded from studying Engineering in higher education because they have not achieved sufficient prior attainment benchmarks. This leaves pupils who do not achieve high grades in their qualifications or those without A-Level mathematics unable to access this field, despite the promise of social mobility it provides.

Engineering students at all levels of prior attainment earn higher wages than the average for other subjects and those with lower attainment experience the greatest added value.

ATTAINMENT OF ENGINEERING STUDENTS

Engineers gain significant financial benefit from their university degrees. However, there is a vast divide within the subject, particularly when viewed in relation to prior attainment, or the grades with which a student entered university (HESA, 2020).

The majority of Engineering graduates achieved higher grades while in school than the average of all disciplines: 52.1% of Engineering graduates achieved 300 UCAS points or above, compared to 42.7% for all disciplines (LEO, 2020). This is ostensibly a consequence of a perceived need for a higher level of skills to meet the demands of an Engineering degree, but it might also be a result of biases. In any case, it limits access for those with lower attainment. For example, the proportion of BTEC Engineering graduates is 4.7% lower than the average for all disciplines (LEO, 2020).

While there are fewer BTEC engineers in higher education, these few students benefit hugely from their studies, suggesting a higher level of 'value added' for BTEC students studying Engineering compared to their A-Level peers. Five years after graduation, Engineering students at all levels of prior attainment earn higher wages than the median earnings for all subjects. Moreover, although high-attaining students (those with four A grades or more) enjoy a premium of £1,100 increase in median wages (LEO, 2020), engineers with BTECs earn £8,100 more than the average wage for students with BTECs five years after graduation (see below). This bucks the trend across all subjects; in Computing, for example, the high-attaining students typically earn a premium almost double that of students with BTECs, and in Biosciences, the premium is more than triple.

This illustrates the vast benefit BTEC students gain from studying Engineering at university, and the financial mobility this line of study can provide (LEO, 2020). Furthermore, a higher percentage of BTEC engineers five years after graduation remain in sustained employment than those with four As or more, at 82.6% and 72.5% respectively (LEO, 2020). BTEC engineers not only benefit themselves, but can also contribute strongly to the wider industry.

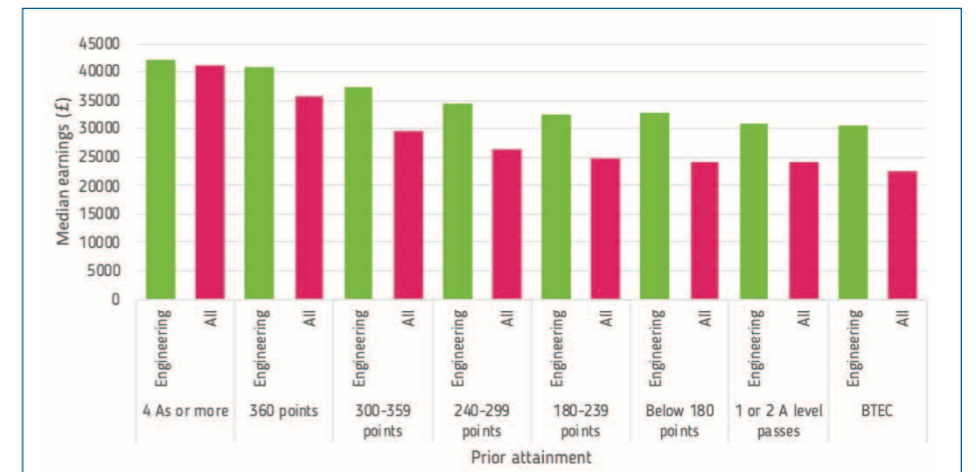


Figure 2: Median earnings five years after graduation by prior attainment. Source: LEO, 2020

A-LEVEL MATHS – THE MISSING PIECE?

Although graduates who completed BTECs prior to their degree benefit particularly after graduation, they face challenges to be accepted into university in the first place and to success in their studies.

Non-progression for first-year students who have BTECs only is 17%, compared to 5% for students with BTECs and A-Level Mathematics (Bullough, 2019). This demonstrates starkly the extent to which A-Level Mathematics improves success in Engineering studies. This difference is most striking in Russell Group universities, where 25% of students with BTECs only do not progress to second year, compared to 4% among Engineering students with Mathematics at A-Level (Bullough, 2019).

Given that 90% of BTEC students at Russell Group universities achieved a distinction in their BTEC qualifications (Bullough, 2019), this suggests even high attainment in BTECs is inadequate preparation for studying Engineering at university. BTEC students within Mathematics need greater support in their initial year in order to level the playing field.

This is important to social mobility because many able students cannot access A-Level Mathematics as a result of well-documented issues such as teacher shortages (see NFER, 2019; Allen & Sims, 2017; Ingersoll, 2006). This results in discrimination towards those students arising from factors outside their control and irrelevant to their abilities and the impact falls disproportionately on

students from disadvantaged areas and backgrounds (Independent, 2018).

Since details of published (advertised or actual) entry qualifications across UK Engineering courses are not centrally held, in order to gauge whether this issue is systemic across Engineering in higher education we obtained a research sample manually by searching for the entry requirements advertised on the websites of universities with the highest number of UK Engineering entrants. Just seven of the 202 MEng programmes and nine of the 235 BEng programmes sampled admit students without an A-Level in Mathematics (Bullough, 2019). This severely limits access for BTEC-only students effectively excluding them from entry to the most selective universities: only 19.2% of Engineering students at Russell Group universities did not have A-Level Mathematics, compared to 59.7% at the post-92 universities.

It appears that the lack of opportunity to study Triple Science and Mathematics perpetuates inequality, as it is highly correlated with social disadvantage.

While foundation years can provide a route into Engineering for some students, it is evident that their access to degree-level Engineering courses is still limited, especially at highly selective universities.

ACCESSING A-LEVEL PHYSICS

While being unable to access A-Level Mathematics remains a large barrier to studying Engineering at university, A-Level Physics also acts as an obstacle to many students studying Engineering.

42.6% of full-time first year Engineering students completed A-Level Physics, with 97.9% of these students also having completed Maths A-Level (Bullough, 2019). For many students applying to studying Engineering at university, this high perceived need for Physics can be off-putting, even for universities or courses where the subject is not required. With 22.2% of A-Level Physics candidates going on to become Engineering students in 2014, it is evident that there are strong links between the two subjects (Bullough, 2019).

Furthermore, many students cannot access A-Level Physics at their school or college, because of a lack of teachers or funding (causing schools to offer a narrower subject range). This situation is more common for A-Level Physics than Maths and it also begins pre-GCSE, when students with lower grades at age 13 tend to be less likely to be chosen by their schools to take Triple Science, or their schools may not offer Triple Science at all, immediately limiting who can access A-Level science subjects (*The Conversation*, 2018).

It appears that the lack of opportunity to study Triple Science perpetuates inequality, as it is highly correlated with social disadvantage. The most disadvantaged students are three times less likely to take the triple science programme (UCL, 2018). It is through this that accessing A-Level Physics remains a barrier for many students who wish to study Engineering at university.

FOUNDATION YEARS?

Given that access to Engineering is limited by prior qualifications, an alternative route for students could be through participation in a foundation year. Indeed, this is the pathway for 12% of full-time, first-year engineers at English universities (Bullough, 2019).

Foundation years generally provide access into Engineering for students with lower grades, as students who complete a foundation year are given automatic entry into the undergraduate degree at their university or higher education provider. This is common practice among providers across the country from the University of Birmingham (UoB, 2020) to the University of Portsmouth (UoP, 2020).

In 2014, 908 students in England and Wales started foundation years with BTEC qualifications, compared to just 425 BTEC students who also had A-Level Maths that entered first-year Engineering at university (Bullough, 2019). There were 47 higher education institutions with students studying for foundation years in 2014 providing a wider choice for students to transition into higher education.

However, accessing Russell Group universities remains difficult for students from foundation years. Just 4.8% of students in first year at Russell Group universities studied a foundation year, compared to 16.3% for post-92 universities (Bullough, 2019). This follows the same trend within admissions to the initial foundation year, with Russell Group universities admitting just over 500 students in 2014 for foundation years, in contrast to more than 2,000 students admitted to post-92 universities.

While foundation years can provide a route into Engineering for some students, it is evident that their access to degree-level Engineering courses is still limited, especially at highly selective universities.

GEOGRAPHIC VARIABILITY

ENGINEERING can provide a rewarding career path for students. However access to the subject remains low in more deprived areas.

There are imbalances in admissions processes, prior attainment requirements that correlate with disadvantage, and uneven support once students make it to university. Their combined effect skews opportunities away from those in more deprived areas of the UK.

These geographical patterns also persist after graduation, perpetuating inequality in the labour market through large regional differences in earnings.

As a result Engineering as a sector does almost as much to maintain regional inequality as eliminate it across the United Kingdom.

POLAR INEQUALITY IN ADMISSIONS

While Engineering at university provides a rewarding career path for students, there remains distinct geographical variability in the admissions rate for students in Engineering. This is reflected in POLAR4 quintiles, which classify small local areas by the participation of young people in higher education to show variation in educational deprivation through a proxy (HEFCE, 2012). Quintile 1 represents the lowest participation – ostensibly the most deprived areas – and quintile 5 the highest participation (HEFCE, 2012).

35.5% of full-time Engineering students are from quintile 5 and just 9.0% from quintile 1 (Bullough, 2019). Benchmarking against other subjects shows the proportion of quintile 1 students is lower in Engineering than the average for all subjects (9.0% compared to over 12% for all subjects), illustrating the extent to which Engineering admissions favour students from areas where attendance in higher education is common and, as a consequence, maintains inequality in access.

The pattern is not just at the extremes: Engineering courses admit a higher proportion of students from quintiles 4 and 5 than the average for all subjects, and a smaller proportion of students from quintiles 1, 2 and 3 (Bullough, 2019).

2018 data from UCAS (presented at the EPC Recruitment and Admissions Forum 2018) below highlights the poor performance of Engineering even at application stage. This shows that the variation between quintiles in demand to study Engineering is wider than in other subjects. Moreover, this ‘demand gap’ is exacerbated by an even wider admissions gap. To achieve fair access to Engineering higher education the gaps must be reduced in both application rates and entry rates between the most and the least represented groups.

This skewed admission rate favouring students from higher quintiles is a problem that is particularly prevalent at Russell Group universities, where 44.0% of all Engineering students are from quintile 5 compared to just 6.3% from quintile 1 (Bullough, 2019). Although Russell Group universities have the lowest proportion of quintile 1 students, the gap is noticeable across all UK universities: Pre-92 and Post-92 universities have just 8.0% and 12.9% respectively of students from quintile 1 (Bullough, 2019). Students from lower POLAR quintiles face systemic barriers in accessing Engineering in higher education.

Quality and standards

The Office for Students is currently reviewing its regulations relating to quality and standards in English higher education institutions.

Its proposals include the introduction of minimum baselines for student outcomes stating that it “is not acceptable for providers to use the proportion of students from disadvantaged backgrounds they have as an excuse for poor outcomes”.

Rather than driving up standards for all students, the EPC’s view is that this measure would be damaging to social mobility. It would discourage universities – especially the most selective – from admitting students from less affluent backgrounds and/or with lower attainment as they will present those institutions with the greatest risk of missing the baseline outcomes.

This is particularly likely in institutions that serve regions of the country with higher levels of deprivation and lower employment rates where, if graduates decide to remain in the region after study, they are least likely to achieve high income premiums.

For students, graduates and universities, social mobility would become more closely aligned with geographical mobility, which would undermine the Government’s ‘levelling up’ agenda.

As stated previously, social justice is best served by fair opportunities and so, while it is important for social mobility to ensure that students from lower socio-economic backgrounds receive high-quality higher education, it would be counter-productive for that to be assured at the cost of fair access, especially given the lack of evidence of any crisis in quality, particularly in Engineering where accreditation of degrees is prevalent.

POLAR QUINTILES AND NON-PROGRESSION

Not only do disproportionately few Engineering students come from areas in lower POLAR quintiles, but these students frequently face greater issues once at university, which is reflected in increased rates of non-progression. Across all universities 8.9% of Engineering students from quintile 1 do not progress to the second year of their studies, compared to 4.3% from quintile 5 (Bullough, 2019).

This rate varies across universities. Russell Group and Pre-92 universities have the lowest non-progression rate for quintile 1 students at 8.4% each, compared to 9.9% for post-92 universities (Bullough, 2019). However, while this may suggest that Russell Group universities provide better support, they also have the largest gap in non-progression rates between quintiles 1 and 5 (2.8% of Engineering students in quintile 5 do not progress compared to the 8.4% of quintile 1 students). Russell Group universities may not be providing the right support to students from quintile 1 and instead are delivering support that favours quintile 5 students.

Importantly, this is not indicative of an inability of quintile 1 students to be successful in Engineering, as for both MEng, BEng and BSc degrees POLAR quintile does not negatively impact the qualification of degrees. This was evident in 2015 as quintile 1 students achieved the highest proportion of MEng first-class degrees for all universities, with 45% of quintile 1 students achieving a first class compared to between 42-43% for all other quintiles (Bullough, 2019). This trend follows for BEng and BSc degrees also, where quintile 1 has the highest rate of first-class degrees (Bullough, 2019).

While students from lower POLAR quintiles may struggle to enter an Engineering degree and then they face higher non-progression, most have at least as great an ability to succeed in their degrees as their higher quintile counterparts.

The proportion of students from low participation areas who drop out before their second year is more than double the proportion from high participation areas.

AFTER GRADUATION: EARNINGS VARIABILITY

Geographical variability within Engineering remains stark after graduation, with large regional disparities in graduate earnings, especially as the years after graduation increase.

Three years after graduation the median salaries of Engineering graduates are highest in Scotland, where they earn between £38,000 and £40,000 annually (LEO, 2020). However Scottish wages in Engineering are significantly higher than the rest of the UK (perhaps reflecting salaries in the oil industry). In the South and East, graduates earn a median of between £32,000 and £34,000, and Engineering graduates in London and the West of the UK earn between £30,000 and £32,000 (LEO, 2020).

Five years after graduation this variability continues to widen as the Scottish median income falls in the range of £40,000 to £42,000, while in the South of England, East of England and London they are £36,000 to £38,000. By contrast, median income in the North of England and Wales is between £32,000 and £34,000, demonstrating the expanding region gap in wages.

After five more years, Engineering graduates in London and Scotland have the highest median incomes of between £48,000 and £50,000 annually (LEO, 2020). This is significantly higher than Yorkshire and the Humber, where median incomes are between just £36,000 and £38,000, or Northern Ireland where they are below £36,000 (LEO, 2020).

This wide regional inequality in income for Engineering graduates does not match the regional cost of living. The weekly cost of living in Scotland (£493.00) is lower than Yorkshire and the Humber (£521.00) despite the higher wages (ONS, 2020).

However, while there is regional variability in earnings, it is important to note that in all regions of the UK, on average Engineering graduates earn more than the median wages for all subjects (see Figure 3). This difference is most pronounced in Scotland, where engineers earn a median of £18,600 more than the median for all subjects. Even in Northern Ireland, where the premium is at its smallest, engineers still earn a median of £8,400 more than the average of all subjects (LEO, 2020).

It should also be noted that the data relates to the earnings of Engineering graduates regardless of whether they have pursued careers in the Engineering sector.

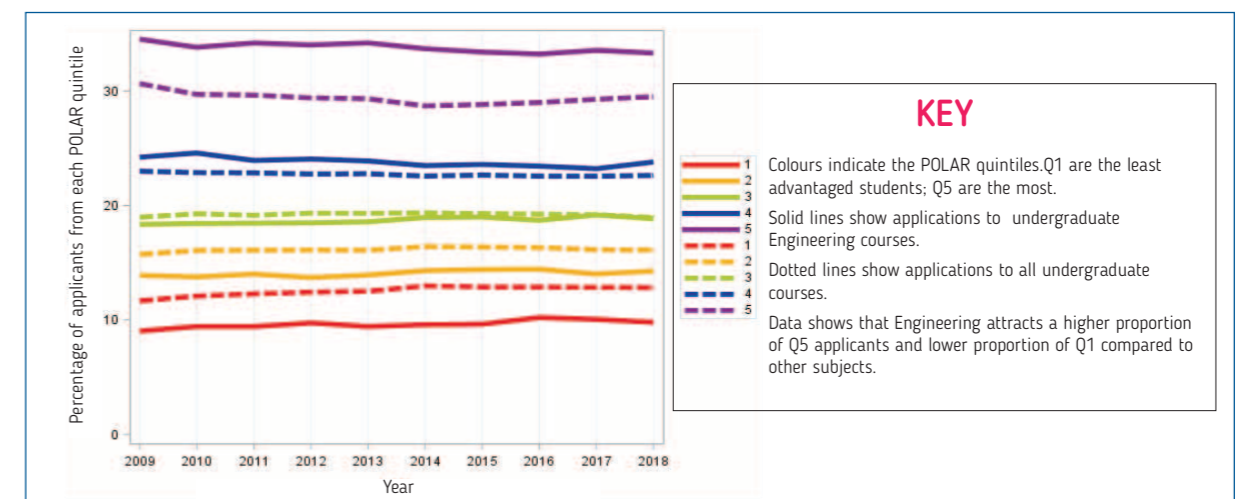


Figure 3: UCAS applicant data (2108) as presented to EPC Recruitment & Admissions Forum 2018

A QUESTION OF GENDER?

GIVEN THE longstanding imbalance in the gender of Engineering graduates, is it possible that the graduate income premium they achieve is not actually a desirable boost arising from their field of study, but rather it is evidence of an undesirable gender pay gap?

In other words, could it be argued that the sole reason that Engineering graduates appear to earn more than other graduates is because more engineers are men and men earn more than women?

One year after graduation, there is indeed a difference between female Engineering graduates' median salaries (£25,900) and males' (£27,000). This difference exists in spite of the fact that female Engineering students achieve slightly better results in their degrees: in 2014/15 for MEng degrees, 47% of female students gained a first-class degree, compared to 42% of male students, and among BEng and BSc Engineering degrees, 25% of females and 24% of males achieved a first-class degree (Bullough, 2019).

As the years progress, the income gender gap widens to £4,300 five years after graduation and £7,600 ten years after graduation (LEO, 2020). However, this does little to explain away the premium over other subjects because, as shown in Figure 5 below, despite earning less than their male counterparts, female engineers still earn more than the male median for all subjects until ten years after graduation.

At this point, the premium for women over non-graduate males disappears, but they still earn a median of around £9,000 more than other female graduates.

There are flaws in the LEO data as they relate to gender (Wonkhe, 2017), but the patterns reveal that a gap suggests that, although gender may account for part of the higher earnings of Engineering graduates, the premium outstrips the gender ratio too significantly to be dismissed.

However, while the premium may be real and significant, for women it does not eliminate the gender-based inequalities in society and suggests that the benefits of social mobility that Engineering may confer will be experienced more fully by men.

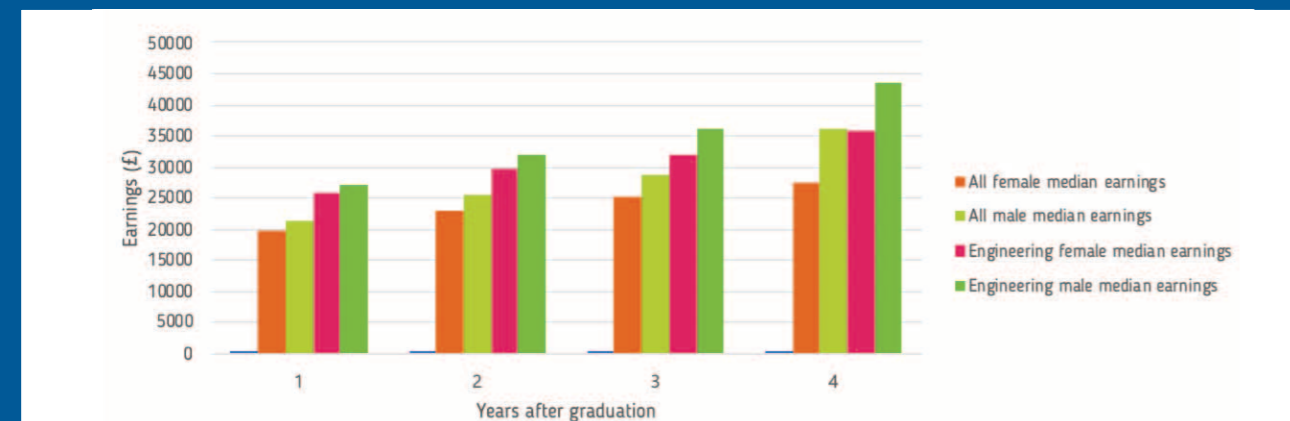


Figure 5: Median earnings for male and female Engineering graduates 1, 3, 5 and 10 years after graduating. Source: LEO 2020

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ABBREVIATIONS AND GLOSSARY

ABBREVIATIONS

BEng:	Master of Engineering (qualification)
BTEC:	Business and Education Technology Council (qualification)
D&T:	Design and Technology (subject of study)
EPC:	The Engineering Professors' Council
GCSE	General Certificate of Secondary Education (qualification)
HEPI:	The Higher Education Policy Institute
HESA:	The Higher Education Statistics Agency
LEO:	Longitudinal Education Outcomes
MEng:	Master of Engineering (qualification)
OFS:	Office for Students
POLAR:	Participation of Local Areas
UCAS:	The Universities and Colleges Admissions Service

GLOSSARY

Contextual admissions: Approaches to student admission to higher education that consider not merely the applicant's qualifications and achievements, but also the wider context in which they were achieved including factors such as socio-economic background, and the records of prior attainment and higher education participation from their school and/or area.

Foundation Year: A one-year introductory course to a full multi-year degree curriculum. These programmes are often intended to support a student's preparedness for Level 4 study students not yet in a degree program or may form part of a specific degree course. Some programmes are designed specifically for either domestic or international students.

Level 3: Further education learning leading to qualifications including A Levels and their equivalents (such as Scottish Highers and BTECs) that are normally accepted as suitable entry requirements for higher education.

Level 4: Higher education learning equivalent to the first year of an undergraduate degree programme.

Non-progression: Non-advancement of students from the first year of higher education to further years as anticipated on enrolment. Typically, this is due to the student dropping out of their enrolled course or academic failure.

Triple Science: The study of three science GCSEs in each of Biology, Chemistry and Physics. Distinct from 'Double Science', which is the study of just two of these subjects.

