# Engineering Professors' Council Evidence for the Education Select Committee: Further Education and Skills inquiry.

**1. Introduction**

The Engineering Professors' Council (EPC) is the representative body for Engineering academics in UK higher education. There are currently 86 institutional members encompassing around 8,000 academic staff (permanent FTE).

Our representation highlights our concerns surrounding uncertainty about which qualifications will be available at Level 3 going forwards and how this MAY impact skills shortages in Engineering. We offer specific insights into BTECs as an entry route to higher education (HE), T level Maths and apprenticeships. The EPC has also supported the development of the Royal Academy of Engineering Education and Skills team evidence and is broadly supportive of their submission.

Engineering is a key driver of the growth that the government wishes to stimulate, adding £645Bn to the UK – that's nearly a third of the entire value of the economy. The engineering sector is a powerhouse of regional development as it is spread remarkably evenly throughout the country. However, according to the British Chambers of Commerce, engineering accounts for one of the largest skills gaps in the UK economy. Engineering higher education plays a pivotal role in minimising this gap, but still, Engineering UK has suggested the shortfall is around 29,000 graduates every year.

**2. Curriculum and qualifications in further education**

T Levels and apprenticeships account for only a minority of learners and, although they are valued as a direct route into engineering by employers, they are failing to meet the nation's needs in terms of feeding sufficient numbers into the labour market to fill the significant skills shortages in engineering. Moreover, such technical qualifications tend not to have a parity of esteem (among employers, learners and the wider public) when compared with higher education qualifications.

The pathway into HE Engineering tends to be through A levels instead. Engineering A levels have dwindled so far as to be a pathway of negligible significance into work or HE. As for other subjects that are seen as pathway subjects (Maths, Physics, D&T and Further Maths), each has challenges in terms of limited availability, shortages of qualified teachers, and a lack of applied learning in the curriculum. Given the importance of the engineering sector to the economy (nearly a third) and the proportion

of the workforce (over a quarter), the absence of engineering across all disciplines in compulsory education is remarkable.

Some technical qualifications have proved to be effective routes into higher education particularly for under-represented groups. In particular, BTECs have long been accepted as suitable by many Engineering courses, but they have been in decline in recent years.

A recent EPC study analysed Level 3 qualifications admissions data based on five years of evidence to better understand the breadth of qualifications which currently facilitate undergraduate study of engineering.

The number and proportion of places on HE Engineering courses for those with A levels has increased over the past 5 years against a backdrop of decreasing acceptances with no A levels achieved (BTEC in particular).

Three in four 18-year-olds accepted to undergraduate Engineering held at least one A level in 2023. Meanwhile, the BTEC Extended Diploma acceptance route into HE Engineering contracted by nearly one-third between 2019 and 2013; a decline most pronounced following the 2021 Government announcement that public funding would be removed from "low-quality" Level 3 courses that overlap with A levels and T Levels.

Our analysis of UCAS admissions data confirms that universities still want applicants with BTECs. In 2023, Circa one in eight accepted applicants to HE Engineering were Level 3 BTEC holders, around a third of whom were supported by A levels. Approximately half of undergraduate Engineering applications from those with BTECs related to the Extended Diploma – considered to be the 3-A level equivalent. (The remainder related to the 2 or 1 A level equivalent Diplomas and Certificates.). It appears that studying the Extended Diploma in Engineering offers an admissions advantage over other BTEC subjects; Engineering applicants were more likely than their other Extended Diploma peers to be accepted into Engineering HE.

The contracting undergraduate Engineering market for non-A level qualifications (where there are now more 18-year-old A level applications holding 3-A levels, who are more successful to acceptances than other applications) reflects falling confidence by schools in the future of BTEC qualifications and a lack of confidence in T levels currently. While we have evidence that studying the Engineering Extended Diploma offers a progression advantage over other subjects, doubts over the route's future are a threat to the engineering talent pipeline.

In engineering, BTECs provide a stable, tested pathway to employment, particularly for disadvantaged learners. EPC research has shown that they are an effective driver of social mobility. It is known that students from disadvantaged backgrounds are currently encouraged to do T-Levels and BTECs rather than A levels, but this can reduce their choices when looking at university and other further study options.

**3. The strengths and weaknesses of T Levels as the main qualification option for students wishing to pursue a technical route into further education.**

T Levels are suffering from multiple systemic issues in terms of their potential availability, their entry requirements and the fact that they require young people to narrow their opportunities significantly at an early stage. Given that engineering is not featured explicitly in the curriculum before Level 3, most learners are unlikely to have the familiarity to make this commitment readily. As a result, T levels serve a different purpose to BTECs and should not be regarded as a replacement. The design of T levels means that some universities do not consider them to compare favourably with A levels for entry to Engineering degrees.

There are lessons to be learnt from T levels design and implementation. Employer-led apprenticeship and T level development has led to narrow Standards representing a small number of large employers (with SME interests largely sidelined). There are regional cold spots in the availability of T levels. Engineering and Construction T level, for example, is not available to all learners in England. Closer scrutiny is needed to ensure that next steps are not compromised by regional disadvantages.

Crucially, T levels were not originally conceived as a basis for HE progression; and HE understanding and acceptance reflects this (as evidenced by entry requirements to Engineering which sometime cite the unlikely combination of both T level and A level Maths). Most university Engineering courses are – to a greater or lesser extent – largely vocational or directly applicable to the working world. With a few exceptions, it is usually a false and damaging dichotomy to design pathways that are explicitly academic or occupational.

To help universities understand Maths in T levels as suitable for HE Engineering, the EPC has undertaken a research project to unpick and better communicate to higher education institutions what maths is contained within the T level and to help admissions staff understand the T level as a teaching mechanism. The research has found that while T levels do contain significant maths content, it is not as explicitly evidenced (when compared to A levels). There are gaps and an inherent trade-off between applied and explicit learning. This work should have been completed by government before the roll-out of T levels and we urge that similar mistakes are not made with respect to future qualification reforms.

**4. The reform of Level 3 qualifications**

If the choice at Level 3 were to be limited to A levels, T levels and apprenticeships, a large proportion of 16-19 year-olds would be underserved and find themselves without a suitable pathway (especially those with passes in GCSE Maths and English and those who want technical qualification, but are undecided on a career). To address this would require such a radical overhaul of the existing content and structure of current A levels

and T levels that they would be largely unrecognisable. It would also be an unnecessary and experimental upheaval given that other Level 3 qualifications, such as BTECs, already serve those purposes, are popular with learners, providers and employers, and are tried and tested (even if they are not without room for improvement).

Technical routes are less well understood by many stakeholders (learners, educators, schools, colleges, parents, universities and employers) than traditional 'academic' pathways. This exacerbates the significant systemic problems that T levels are encountering, such as capacity in the system for industry placements (particularly at a regional level).

Within A levels, the challenges presented by the mutual exclusivity of knowledge within A level exam boards presents difficulties with interdisciplinarity. Addressing this is particularly important given the proposed "unique" qualification for any given subject. Inconsistency of content and approach between A level exam boards has evolved an industry of provider decision-making re: 16-19 A level (and other) provision.

**5. How to resolve the skills shortage and narrow the gap between the skills that employers want and the skills that employees have.**

University involvement in qualifications reform is essential to ensure a coordinated approach that will in turn inform HE providers' decision-making about admissions, course provision and curriculum development to accommodate the learners and workers of the future.

The availability of post-compulsory education is driven by learner choices (where funding follows students on a per capita basis) or by employers (where they directly provide funding). This leaves no market drivers to ensure wider and longer-term labour market needs are balanced with learner choice (especially in publicly funded courses). The funding mechanism in FE (and HE) needs to be reviewed to factor in future workforce requirements. There are also insufficient drivers to ensure equal access to educational and training opportunities.

An EPC report, Experience enhanced, based on a two-year project to assess policy and practice around *degree* apprenticeships, offers some feedback on improvements across all levels of apprenticeship. Our recommendations spanned four areas: ensuring the best possible learning experience and outcomes for apprentices; the need for closer collaboration between employers and learning providers; the importance of building professional into the pathways of apprenticeships; and the financial sustainability of degree apprenticeships.

We found that apprenticeships intended to be 'employer-led' can become 'employer-dominated', failing to focus on apprentices' wider learning and long-term goals. We urge caution on overdependency on employers specifying what they want/need; their

tendency will be to consider short-term labour market undersupply and to act in their own interests. Meeting employers' short-term interests may often be a cheaper or quicker alternative for them than investment in technology and/or more efficient processes. However, by the time Standards start to deliver a workforce trained to the supposed needs, the investment may well have been necessitated and the labour shortfalls addressed. It is critical to factor into the development of new qualifications and Standards voices that will represent the interests of learners over the longer term – their career lifetime, for which they need to acquire flexible and resilient skills that can develop as circumstances and the labour market change.

**6. Workforce pressures on delivering further education**

Each year, there is a shortfall of engineers entering the sector because there are not enough Engineering graduates. There aren't enough graduates because there aren't enough Engineering students. There aren't enough students because there aren't enough pupils taking feeder A levels – particularly Physics – and there aren't enough pupils because we have reached crisis point in the availability of Physics teachers. The same is true in most other STEM subjects too (especially Maths and D&T).

Many school pupils simply can't choose Physics because there are no teachers – especially in disadvantaged schools. More than half of mainstream secondary school teachers report current understaffing in Physics[1], while the pipeline of trainee physics teachers is languishing at less than 25% of Government recruitment targets.[2]

EPC research for the Institute of Physics explored the appetite to support Engineering graduates to enter the teaching profession to teach Physics. We found that there may be policy changes which would support Physics teacher recruitment in relation to teacher pay and conditions; sector success metrics; and though provision and support of paid Physics teaching internships.

Meanwhile, a shift toward Further Education (FE) institutions seeking degree-awarding powers within an uncoordinated funding environment is crying out for alignment with level four partners but hampered by the lack of HE funds to support subsidies and staff arrangements at (local) FE level. In 2024, PWC reported that HE staff costs account for c.54% of total expenditure on average leading to a material cost base exposed to inflation and salary negotiations.[3] In HE and FE, restructures, redundancies and early retirement schemes have led to the attrition of the most experienced lecturers and senior Engineering staff, who have opted for final salary schemes instead of pay cuts, compounded by staff attrition to industry. Recruitment challenges have led to a culture of academic or industry-based hourly paid lecturers (HPLs) pushing up costs further

[1] https://www.iop.org/about/news/state-schools-losing-out-physics-teacher-shortage
[2] https://www.iop.org/about/news/physics-teacher-training-figures-still-off-target
[3] https://www.universitiesuk.ac.uk/sites/default/files/field/downloads/2024-01/pwc-uk-higher-education-financial-sustainability-report-january-2024.pdf

and presenting course delivery uncertainty. High attrition rates – which can be particularly high-risk among small teams of staff – and the difficulty in recruiting qualified staff in STEM fields is putting the sector under unprecedented stress. EPC members have given examples of high-quality, accredited, engineering courses ripe for closure due to costs and staffing, where no other providers in the nation deliver the much-needed programme economically. This is relevant because the pipeline of FE staff depends on the health of Engineering educationalists at Level 4+, as well as Level 2-3.

**7. Widening access to higher education**

Engineering offers an excellent route to social mobility for people who have traditionally been underrepresented in higher education (and, unlike many other routes, social mobility in engineering is not premised on geographic mobility). However the pathways into engineering are too narrow for those same groups.

Almost all A level acceptances held at least one A level in Maths, Further Maths or Physics. the data shows Maths to be a key facilitating subject for undergraduate Engineering. This phenomenon is driven by application behaviour, not selection processes. Applicants without Maths, Further Maths and/or Physics tend not to apply for Engineering courses.

There has nonetheless been an increase in applications to Engineering since 2019, largely driven by 18-year-olds. In the most recent UCAS data, this amounted to a 14.5% rise. However, the marginal cost of admitting additional domestic students far outweighs the marginal revenue from fees and so the number of available places to study engineering has not kept pace with the rise in applications because HE providers cannot afford to make such substantial losses on high-cost courses.

A level, BTEC, SQA, Access to HE, International and Welsh Baccalaureate qualifications (and GCSE level supplementary requirements and Tariff scores), were the most cited Engineering entry requirements in 2023. This arguably drives an expectation of parity across theses qualifications for potential applicants, but our research shows that BTECs are largely the preserve of lower tariff providers while the highest, A level, achievers and those with access to Further Maths monopolise the most prestigious providers.

In Engineering, BTECs provide a stable, tested pathway to employment, particularly for disadvantaged learners. BME applicants and those with disabilities are overrepresented in BTEC Extended Diploma admissions cohorts. Extended Diploma applicants are, in fact, more commonly BME than White and BME applicants were more likely to be accepted than their White counterparts. The decline in BTEC acceptances since 2019 has, by and large, bypassed BME applicants. BTECs are predominantly the domain of

the college sector when it comes to admissions (i.e. attractive to those who leave the school system at 16).

EPC research has shown that BTECs are also an effective driver of social mobility and that the earnings premium afforded by studying HE engineering was greatest for engineers with BTEC qualifications. They earned an average of £8,100 more than the average wage of other graduates with BTECs five years after graduating.[4]

Applicants with all types of disability are overrepresented in both the BTEC Extended Diploma applicant and accepted applicant populations. In fact, the number of those with disabilities has increased starkly in the last five years, with the number of 18-year-old A level acceptances declaring a mental health condition, such as depression, schizophrenia or anxiety disorder nearly doubling between 2019 and 2021, and then tripling since then. Applicants with disabilities are increasingly advantaged in provider-side decision-making. By and large, applicants with disadvantage often highlighted in contextual admissions (free school meals, parental HE and care experience) are not. Those from high HE participation areas remain massively overrepresented in Engineering acceptances, and this is more extreme among the A level cohort; only one in five accepted A level applicants were from the lowest two participation groups.

[4] https://epc.ac.uk/article/media-release-studying-engineering-gives-turbo-boost-to-social-mobility-reveals-new-epc-research/