

CLOSING THE SKILLS GAP

Institution of
**MECHANICAL
ENGINEERS**

The looming shortage of skilled engineers is seen as a major obstacle to restoring the UK's economic vibrancy. Historically, labour markets have been able to adjust to follow economic trends, but we can no longer assume that this will happen. Raised levels of unemployment can now stubbornly exist alongside high skills demand in other sectors in a "two-speed labour market"^[1]. A laissez-faire approach to skills will be insufficient to meet future requirements. Though broad agreement exists about the critical importance of increasing the supply and retention of engineers, no real consensus has been reached on how to achieve this.

This policy statement sets out a framework that is needed for Government, industry and education to build a coherent strategy and work together to narrow the gap between the demand and supply of engineers. It presents recommendations for action to attract more young people into apprenticeships and engineering degrees, and examines how better co-ordination will also lead to greater retention of engineers throughout their careers.

- 1. Careers.** Careers-related learning must be a core feature of mainstream education – as is the case in other countries that successfully recruit into engineering – and not simply be left to a plethora of external agencies. Misinterpretation of impartiality should not prevent young people from finding out about the breadth of career routes and destinations^[7].
- 2. Employer-education partnerships.** Evidence exists that pupils benefit from their teachers having authentic experience in industry and in research environments. Government should both support and incentivise a new wave of teacher industrial and research placements, that will lead to stronger ties between employers and schools.
- 3. Evaluating what works.** Informal learning initiatives can have a powerful influence over young people's career paths. The engineering community needs to be more robust in evaluating which enhancement and enrichment interventions work best, and use this evidence to plan how best to make use of its finite resources.

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BACKGROUND

At a meeting jointly hosted by the Institution of Mechanical Engineers (IMechE) and the Institution of Engineering and Technology (IET) in February 2013, key players from some 30 organisations representing industry, academia, sector skills councils and Government, came together to evaluate what needed to be done to address the projected future shortage of engineers^[2]. Discussions from the meeting form the basis of the issues discussed in this document. They centred on determining specific courses of action to create a co-ordinated plan to close the gap between skills demand in industry and supply from education.

Delegates identified four areas of action:

- Improving partnerships between employers and the education sector
- Greater clarity in defining the purpose of activities to promote engineering to young people, leading to reduced fragmentation
- Understanding what influences engineering graduates' career decision-making
- Creating a profession that better reflects the diversity of society and that draws on all the latent talent available.

EDUCATION AND SKILLS – THE KEY TO LONG-TERM GROWTH

Good engineers are in demand across the globe, so the UK vies internationally with traditional and emerging competitors for both business and skills. Even though a universal mismatch exists between demand and supply of engineers, the UK is facing a particular challenge as its baby boomer generation nears retirement. With 127,000 new STEM professionals and technicians required every year of the decade to 2020, approximately 90% of this number is needed simply to replace the retiring post-war cohort^[3].

We must attract and train more engineers to rebalance the UK economy, and by doing so, help to grow its high-skills manufacturing and engineering base. Careers in engineering should be made more attractive, both to sections of society under-represented in the profession, and to those who are working towards an engineering qualification.

Greater emphasis on choice and equity of access has created a real challenge for skills provision in the UK. Market forces may work best for business, but the national supply of skills requires greater vision and a longer-term view. The education and training system also struggles to respond as quickly as market changes require, because of the long time taken for students to acquire knowledge and skills.

In addition, tomorrow's prospective engineers and technicians are poorly informed by schools and colleges which, being judged solely on examination success, focus their energies accordingly. Progression post-school tends not to be a high priority, and matching to national skills needs, even less so.

The CBI has identified that the UK's key weapon in the international competition for business is "...in having a flexible, highly-skilled and motivated labour force"^[4]. It states the source of this labour force is "better education", that will add £8 trillion to the UK's GDP over the lifetime of a child born today.

But better education should also include greater awareness of the breadth of career opportunities and labour market information. Legitimate historical concerns over 'labelling' children and limiting ambitions of young people from marginalised backgrounds, have created a system that may actually disadvantage those it aims to support. The logic is straightforward and, in relation to engineering, operates as follows:

- Schools offer non-directive (impartial) careers guidance, so as not to limit the aspirations of young people. This means individual students are not guided along specific career paths, and are too often unaware of the full range of options open to them.
- Teachers are a major source of information about careers, yet their expertise in this area is limited – only 17% of young people feel that teachers are useful in this role^[5].
- Engineering is not part of the school curriculum and many STEM teachers are unfamiliar with the subject and careers that arise from its study.
- Awareness of engineering as a possible career option for young people in the UK is generally very low^[6], as is understanding of vocational career routes.

Misinterpretation of the need for impartiality must not prevent advice being given that some subjects and qualifications (in particular, science and mathematics) have greater value in the labour market than others.

CAREERS PROVISION ON LIFE SUPPORT

Taken together with careers provision, described as "being on life support in some schools"^[8], the need for radical change is highlighted in research led by the Education and Employers Taskforce. Its report^[9] shows how 20% of teenagers aged 15–16 were aiming to get jobs in just 2.4% of occupations that fell under the heading, 'culture, media and sport'. Even at age 17–18, the percentage that hoped to become engineers (2.4%) was lower than those wishing to become actors (2.5%). The report's authors suggested that the labour market does not work effectively in signalling to young people the breadth of opportunity and the skills and qualifications needed. 'Signalling' goes to the heart of the matter. The need is to provide careers education, information, advice and guidance that balance aspiration and choice with realism, and which indicate and quantify differences in pay between sectors. Girls, in particular, need robust careers support that helps challenge their own and others' expectations.

Most of the Government's education focus is on academic routes, at a time when there is increasing potential for more diverse approaches, especially technical and vocational. School performance measures, parental knowledge and teacher expectation all favour university entrance over other options. The absence of real careers guidance compounds the problem and renders academic study as the default.

Of course, we should not expect each young person to make career choices based on national demand, but equally how can they be expected to make truly informed decisions when they remain largely unaware of entire sectors? Right now school students are often oblivious to careers within these sectors and unacquainted with the potential rewards on offer.

PATHS TO AN ENGINEERING CAREER

The STEM community has enthusiastically committed resources to enticing young people into engineering through numerous 'breadcrumb trails' (after-school clubs, Big Bang fairs and more), but the projected shortfall in engineers means that what may be needed are well signposted 'motorways'. The publication in 2002 of SET for Success: the supply of people with science, technology, engineering and mathematic skills^[10], resulted in the proliferation of thousands of initiatives designed to show the value and excitement of STEM. With each passing year, more programmes and activities are added, so that the field is now crowded with players: public sector, not-for-profits and commercial. This need for organisations to 'do something' may be driven by a commitment to long-term planning, but it can also be a product of corporate social responsibility priorities, or other short-term organisational targets. These concerns are echoed by Yvonne Baker in her role as Director of the National Science Learning Centre, when she writes:

"It is all very well getting a young person fired up about science on a Saturday, but ultimately what happens in the classroom will determine whether that individual progresses."^[11]

Some 'motorways' already exist: Stimulating Physics Network, STEM Ambassador scheme, National STEM Centre and University Technical Colleges spring to mind. But skills shortages in engineering are a national issue, requiring leadership and co-ordination – and Government should take charge. It is only Government who can offer incentives beyond free market forces to change practice by taking a longer view, but must also project beyond single spending reviews and parliaments for the good of the nation and future generations.

Increased commitment from Government would offer greater comfort to employers to take on a bigger share of the burden for longer-term skills planning. In the end it is the partnership between employers and schools that matters most, with industry taking a lead, especially in work-related learning. Government should make it more attractive for industry, especially

smaller companies, to develop meaningful and sustained relationships with schools and colleges, for example, through investing in the provision of high-quality industrial placements for school teachers and authentic work experience opportunities for their students. But industry must play its part in long-term sustained national skills provision that goes beyond simple corporate social responsibility.

In Germany, students are taught about labour markets along with types of career and principles of career choice. Schools work with local employers who provide rich opportunities for work experience. Employment offices keep students up to date with the changing nature of the labour market, apprenticeship and higher education opportunities and direct employment opportunities post-school. Finally, careers counselling takes place two years before the end of school, both on site and in employment offices.

A specific area in which the UK Government should bring schools and employers closer together is in promoting apprenticeships. The Coalition has made progress on expanding apprenticeships to meet the needs of the changing economy, and looks likely to implement many of the recommendations made in Doug Richard's Review of Apprenticeships^[12]. Richard places responsibility for boosting apprentice demand firmly with Government, and proposes new mechanisms of bringing employers and prospective learners together including through an 'apprenticeship milk round'. He argues that the apprenticeship route is offered as a genuine and valuable pathway to a successful career and that more effort should be made to ensure that schools, teachers and parents have a better understanding of what a high-quality apprenticeship can offer. Further promoting apprentices and technicians would present a broader range of careers to school students and offer alternative pathways.

THE LACK OF A SHARED PLAN

The Institution of Mechanical Engineers had previously set out how it saw the division in responsibility for nurturing skills^[13]. Government, it stated, needed to produce a cross-departmental vision that informed business, education and training planning, while encouraging the engineering community to produce a plan to raise the profile of engineering in education. The fragmentary nature of Government in this arena reinforces the need for a cross-departmental strategy – since responsibility for education across the UK is both devolved and separated from business.

Views expressed at the IMechE/IET meeting echoed those expressed more broadly by industry, which would welcome stripping back 'breadcrumb trails', replacing them with something more substantive and strategic. Similar sentiments were evident in a recent survey of engineering and IT employers, where only 11% favoured developing more 'enrichment' activities as an action to resolve skills shortages, while more than 30% stated they would prefer activity improving the image and profile of engineering in schools, with 20% stating that improving the school curriculum would be their action of choice^[14].

CONCLUSIONS

The UK's future economic recovery and long-term stability will be heavily reliant on high-quality engineering, manufacturing and design. For a generation, the development of skills in our education sector has been skewed to supporting a service economy and focused on equity of access. While the UK has attempted to broaden the pool of young people entering academic study, we have neglected technical and vocational skills development. Meanwhile, too few young women choose to become engineers. The changes now called for will require strong leadership from Government and committed support from industry, working in partnership with schools and colleges. Overall, consistent Government commitment and messaging are also necessary to demonstrate to pupils, parents and teachers the real value in pursuing STEM study and not simply for access onto university courses. In turn, this stable foundation will lead to an increase in numbers choosing to study science and mathematics – especially among girls and other under-represented groups.

It is therefore crucial that all the sector skills councils, trade associations, third-sector enhancement and enrichment organisations as well as existing engineering professionals, work in unison rather than isolation. Passionate urging and fragmented campaigning at best confuse prospective interest and at worst turn it away. It is only through a co-ordinated system and consistent messaging from all involved that growth through a rebalanced economy can occur.

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RECOMMENDATIONS

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