

THE SKILLS GAP – RECRUITMENT INTO THE ACOUSTICAL ENGINEERING INDUSTRY



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Chris is an active researcher, focusing on the human response to noise, including the effects of leisure activities on hearing loss, and the acoustic design for restorative spaces (in both the real and virtual worlds). He is also a Director of Positive Acoustics Ltd, an independent consultancy offering design and advisory services on acoustics and noise control.

Professor Barlow is a member of the Institute of Acoustics' Council and chair of its Education and Learning Working group. He was also on the UK Executive committee of the Audio Engineering Society from 2015-2019, and has been chair of AES South of England Group since 2016.

We are exposed to noise on a daily basis – from traffic, aircraft, industry, mechanical ventilation systems and construction, as well as neighbourhood noise. In the United Kingdom 83% of the population already live in Urban areas (OfNS 2018), and 68% of the world's population are anticipated to be living in urban areas by 2050 (UN, 2018).

From an evolutionary perspective hearing is a defence mechanism – our hearing is able to trigger responses even when we are asleep, activating stress hormones. Even noise which we think that we are accustomed to causes an involuntary response (Waye et al, 2003), which increases stress and disrupts sleep. Continuous exposure to noise can lead to an increase in a range of health problems – particularly those associated with stress, such as cardiovascular disease and mental health.

"Noise has a significant impact on mental health and individual wellbeing. Managing sound will be central to the design and construction of future cities." (UKAN 2019)

The Acoustics industry is concerned with all aspects of sound and vibration. We need sufficient acoustical engineers entering the industry to address these issues – whether providing mitigations for existing problems or designing new products which make the world quieter or more pleasant. However it is anticipated that

there will be a shortfall of 59,000 people per year entering the engineering and technology industries over the next 5 years (Engineering UK, 2019), and acoustics is one of the industries suffering from a recruitment crisis.

A major issue is that Engineering in the UK suffers from a lack of gender diversity, with only around 29,000 of the total of 165,000 students (17.5%) being female (Figure 1).

This is a problem which is not unique to Higher Education. Schools, charitable organisations, professional bodies and government have worked in

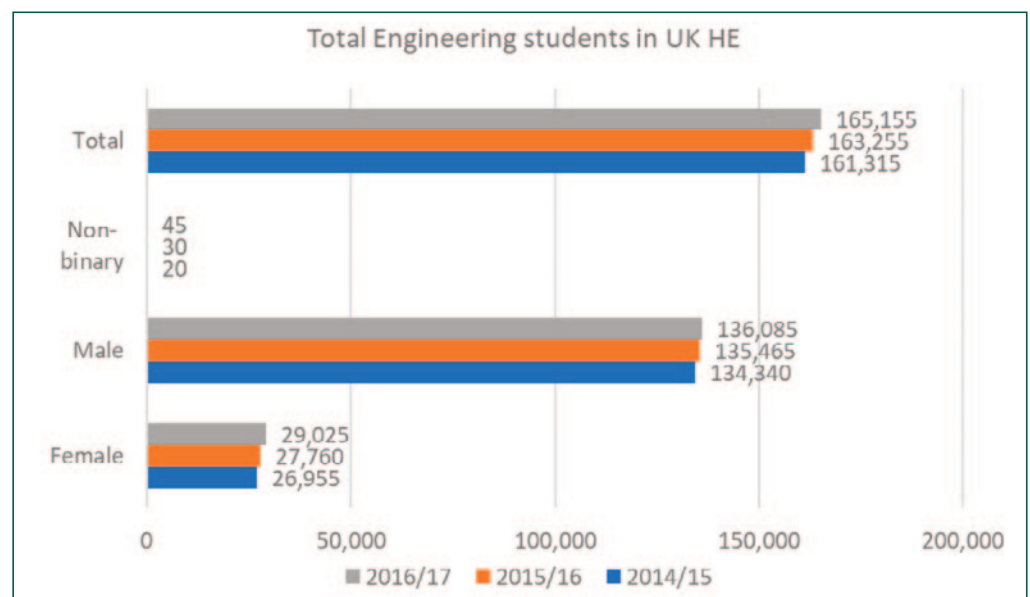


Figure 1: The Diversity gap in Engineering. Source – Higher Education Statistics Agency

recent years with some success to improve recruitment into STEM subjects at school level, and in particular to increase the proportion of female students. In 2018 for the first time more female students than male students took A level science subjects. However while chemistry and biology have made significant increases in the proportions of female students over the past decade (figure 2), for some reason this success has not been reflected in Physics, where the proportion of female students remains very low at around 23%.

addressing the recruitment shortfall in engineering.

THE AWARENESS GAP

Recruitment problems are made worse by a general lack of awareness among young people of engineering occupations. Only 25.5% of young people aged 14 to 16 reported knowing what people working in engineering actually do, and a key attractor into a career is understanding what the job role entails (Engineering UK).

This problem is considerably exacerbated for the acoustics

At the same time, the industry is growing. Although there is no data for direct comparison prior to the 2019 report, the Association of Noise Consultants (ANC), the largest individual trade body in the UK for acoustics, has reported progressive increases in the size of member companies over the past decade, indicative of significant growth in the sector. However 56% of ANC member companies also report problems recruiting appropriately qualified staff.

who would be most likely to enter an engineering career. This issue of awareness is not just restricted to people of school age. A report in the Independent in 2017 classified *Acoustics Consultant* as the second 'weirdest' job title in the UK, which indicates a wider lack of awareness of the industry.

RECRUITMENT, EDUCATION AND TRAINING

There have been traditionally four routes into Acoustics – via an undergraduate degree, postgraduate degree, professional qualification or direct recruitment from mechanical engineering, physics or maths graduates and in-house training in acoustics in the company. With increased competition for engineering graduates they are progressively harder to recruit into acoustics. This is also a sector that is dominated by SMEs. Seventy-two percent of member companies of the ANC have 10 or fewer staff. Small companies find it hard to train graduates internally due to the disproportionate costs of taking senior staff away from income earning activities.

Higher education provision in recent years has been heavily driven by supply and demand, and small, specialist subjects struggle to survive. There are only four institutions offering undergraduate courses in the UK which specialize in Acoustics. Only seven institutions run taught Master's courses in Acoustics. Though there is an increase in the size of the sector, most institutions report stable or gradually declining numbers on acoustics courses. Three institutions have closed acoustics courses or ceased recruiting in the last 8 years.

The Institute of Acoustics recognized as far back as 1975 that there would need to be

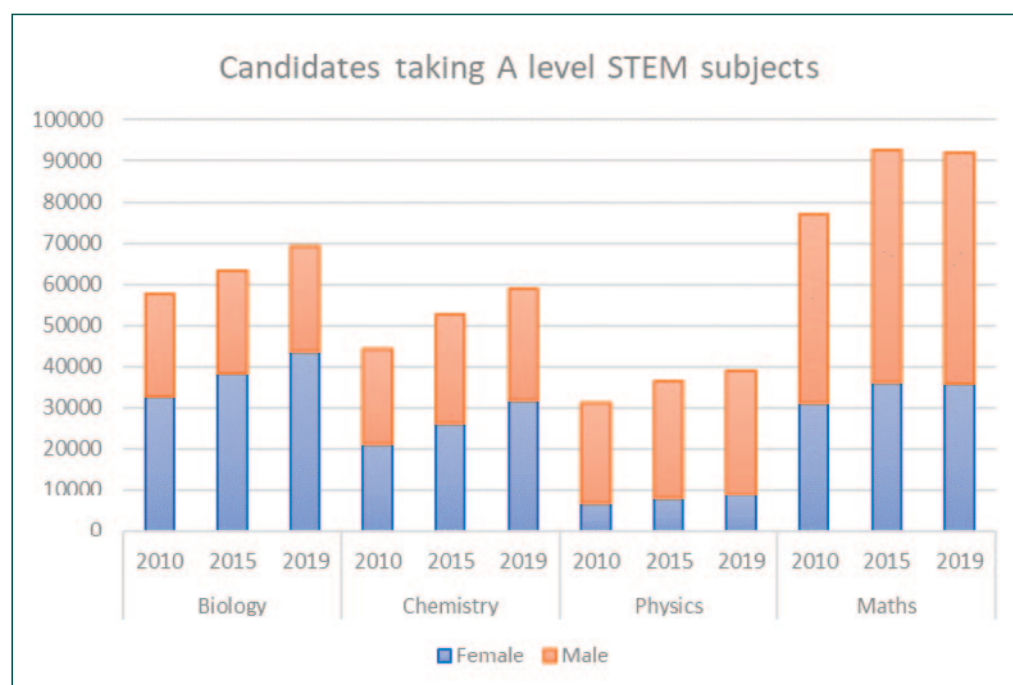


Figure 2: Candidates taking STEM subjects at A Level (Source, Joint Council for Qualifications)

Since the early 1990s, the proportion of girls in the A-level physics cohort has not fallen below 20.7% but not risen above 23.1%. (Institute of Physics).

In addition, only 39% of Maths candidates are female, and as Maths and Physics are generally core requirements for engineering courses, the engineering industries are missing a significant recruitment pool. There are complex reasons for this which include societal perception of these subjects as 'boys' subjects, and a focus on attracting female students into Physics needs to become a key policy when

industry. A report published in 2019 shows that the acoustics industry contributes £4.6 bn annually to the UK economy (UKAN, 2019). This makes it larger than the Music industry at £3.5bn (UK Music, 2019). However as acoustics is an enabler rather than a product in its own right, it is a 'hidden' industry and very few people are aware of career opportunities in the sector in the same way that they are with the music industry.

There are a number of influencing causes for this – not least the awareness of the term itself. Although it is the term which encompasses all aspects of sound and vibration, the word 'Acoustics' is very rarely mentioned in the school curriculum at any level, with the main appearances being in creative subjects such as music. It does not appear in the A level Physics syllabus leading to a lack of awareness in school leavers

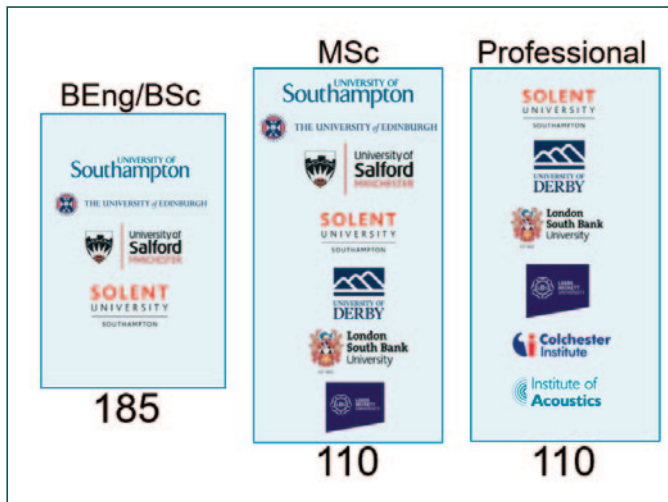


Figure 3: Institutions offering acoustics courses and total numbers of students at each level in the UK

more specialists in the discipline of, and developed its own professional qualification aimed at those coming out of non-specialist qualifications, and is offered by 6 institutions.

Figure 3 shows the approximate total numbers of students specializing in acoustics across all institutions at each level in the UK. This gives a national total of approximately 185 undergraduate students, 110 taught MSc students and 110 professional students studying towards an acoustics qualification, around 270 of whom enter the workforce each year.

Acoustics therefore forms a tiny proportion – less than a quarter of a percent – of the total number of engineering students in the UK.

It is typically expected that people will change careers up to 3 times across their working lives, so we do not just need to look at traditional ‘graduate’ populations for recruitment. There are considerable opportunities for people changing career from relevant industries such as the audiovisual industries. However people changing careers need the ability to fund their relevant training, and this is something that people often struggle to do.

We need to consider how the UK can better support the cost of reskilling and career change, as this could support our industry as well as many others.

ADDRESSING PERCEPTION ISSUES

As well as awareness there are a number of perception issues which affect recruitment. Many people view acousticians as part of the ‘heavy engineering’ industries – primarily construction site engineers. This fails to recognize the wide range of roles for acousticians in the high tech industries such as aerospace, computing and smart technologies, all of which extensively require acoustical engineering.

The industry has tried to address this from a number of angles. Both the Institute and professional organizations undertake outreach and awareness campaigns to get young people to better understand the acoustics industry. This includes the ANC’s #ExploreAcoustics campaign, the IoA’s *A Sound Career* guide (with accompanying video and social media campaigns), and support for the International year of sound 2020 with a range of events.

This year the acoustics industry has launched a level 4 apprenticeship as a new trial. This is new territory for the sector which has traditionally recruited from the graduate market, but has been identified as a way of both attracting young people into acoustics and helping to reduce the skills shortage. Further discussions are taking place regarding developing more apprenticeships at other levels.

The industry are also involved in a wide range of STEM outreach initiatives aimed at getting Acoustics known at a younger age so that people can make appropriate school and career choices. This has included the Institute commissioning *Edinburgh Science* to undertake specialist outreach events across the country, a new exhibition at Winchester Science Centre specifically focused on Sound and Vibration supported by industry and academic partners, and engagement with initiatives such as *Big Bang* and *Tomorrow’s Engineers*, which aim to enthuse a younger audience about careers in STEM. The Institute is also liaising with other relevant professional bodies to increase awareness of Acoustics in those professions (including organizations in Construction, Architecture, Environmental Health and Planning).

Is it enough? Simply, no. In order to continue to address the need to deal with noise as a major health problem we need more acousticians in all the industries which are served by acoustic engineers. We need to recognise and promote the diverse sectors in which Acoustics operates and make people aware of the potential job roles for acousticians in high tech industries as well as ‘heavy’

industries. We also must address awareness of the industry amongst those choosing careers, for instance by specific mention of Acoustics in relevant school curricula and UCAS guides. This needs some support from policy, to make potential students aware of the potential of acoustics as a career.

In particular, as a country it is essential to address the serious diversity gap in engineering education. This would help all parts of the engineering sector by recruiting from a larger pool of potential and benefit the economy as a whole. This requires much more work to address diversity issues in physics and maths at school level, identifying and addressing the causes of this diversity gap. We also need to improve our funding structures available for career-change, perhaps by making the postgraduate student loan available for professional as well as degree courses?

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