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WILTSHIRE LIFE
Independent Schools Guide

Taking up the challenge to inspire female engineers

James Johns, Head of Physics, Dauntsey's, explains why it is so important to ensure we close the gender gap in engineering.

Engineering is shaping the future all around us. From robotics and artificial intelligence, to mobile phones, medical technology and advanced sports equipment, to driverless cars and space exploration. All very exciting and yet it has long been acknowledged that STEM (Science, Technology, Engineering and Maths) options from school through to post-graduate and career paths have something of an image problem.

The number of jobs requiring STEM skills is expected to rise at twice the rate of other occupations over the coming years (UKCES 2016, *Working Futures Summary Report*), so, unless much greater numbers of technically trained individuals enter the workforce, the impact of the skills gap will worsen. The scale of this skills shortage has been illustrated by the Social Market Foundation, which found that despite recent increases, there remains a shortfall of around 40,000 STEM graduates in the UK each year (Social Market Foundation 2013, *In the Balance: The STEM human capital crunch*). Engineering UK estimates that this shortfall in the supply of engineering skills alone is likely to cost the UK economy £27 billion a year from 2022 (Engineering UK 2015, *The state of engineering*).

There continues to be a particular issue in attracting women and girls to this industry. The gender gap is surprisingly wide with the UK having the lowest percentage of female engineering professionals in Europe, at less than 10 percent. According to the Institute of Physics, between 2010 and 2016, the number of people studying A-Level Physics grew by more than 15%. However, in England, only one fifth of the candidates entered for A-Level Physics are girls, and this has changed little over the past three decades. Just 1.9% of girls chose A-Level Physics in 2016, compared to 6.5% of boys. If we could shift the perception and encourage equal numbers of female STEM participants, the skills shortage would all but disappear.

A European study by Microsoft (Microsoft 2017, *Why Europe's Girls Aren't Studying STEM*) is of particular interest to me. It found that the majority of girls became interested in STEM at around the time of starting secondary education, but that their interest had begun to wane prior to making A-Level choices. This tells me that we have a key window where we as teachers can influence decisions that will set the trajectory of these students' academic life in the long-term.

When you look at GCSE, A-Level and university scores, girls tend to outperform boys in STEM subjects when they choose to do them. We must, therefore, increase their desire to pursue those options. Does a lack of female role-models in the wider media make STEM less attractive? On Twitter, 92% of the most followed scientists are male and if asked to think of the current faces of physics, I expect that Jim Al-Khalili, Brian Cox and perhaps even Morgan Freeman come to mind before the brilliant Dr Helen Czerski.

The key to inspiring future female engineers and scientists lies firmly in the everyday formative experiences of students at school. Here at Dauntsey's, we are lucky to have been able to appoint a second female physics specialist. Three of the four previous schools that I have worked at didn't have any. Practical engagement in lessons is vital and Physics at Dauntsey's is taught in way that engages with the current interests of our pupils, whether it is explicit in our specification or not. As a Head of Department, I would be astounded if the reason a pupil gave, boy or girl, for not continuing with physics at a higher level, was because they found the subject boring.

> 'Attitudes are slowly beginning to change'

Our efforts appear to be paying off. Nationwide, girls make up just over 20% of all A-Level Physics entrants. Here, more than 30% of our Upper Sixth Physics classes are girls and an equal percentage of boys and girls have attained university offers for STEM subjects this year. Half of the Upper Sixth girls taking A-Level Physics here have applied for Physics degrees.

As a department, we work closely with the careers department to begin engagement with STEM during the critical pre-A-Level period. We help promote the EDT (Engineering Design Trust) residential courses for GCSE pupils. We are particularly keen to promote the female-only INSPIRE courses.

Research has found that girls are more likely to engage in STEM and that they feel more confident when in female-only environments. This is proving to be successful; one girl in the Lower Sixth attended the Cambridge masterclass on physical natural sciences and has been accepted on a summer placement for structural engineering in August. Another secured work experience with BP: material science, chemistry and engineering related. She has also been accepted on a four-day engineering summer school in Swansea in August. Finally, we have six Lower Sixth girls attending a three-day trip to CERN in Geneva next spring.

The careers department recently ran a trip to the Sandhurst STEM showcase for girls. This was designed specifically to inform girls about career opportunities in STEM. Companies including Airbus, Dyson, Jaguar Land Rover and Network Rail were there, talking about what they do and the career opportunities available – all our girls came back truly inspired by what they learnt.

The message is starting to get through. We recently had a Sixth Form girl land a much sought-after degree apprenticeship in engineering; the competition was very tough, tougher than for many leading university places. She has recently come back to talk to our Sixth Form about the challenges facing women in engineering. She is an inspiration for girls aiming for a career in STEM-related fields. Increasingly schools, and pupils, are recognising that university is not the only path to pursue. Degree apprenticeships provide a great opportunity to continue education whilst contributing to a workforce and getting hands-on experience, which is particularly valuable in the engineering industry.

Attitudes are slowly beginning to change but Microsoft's research found that 70% of British girls said they would feel more confident pursuing STEM careers if they knew men and women were equally employed in STEM disciplines. The lesson – for us all – starts at school. WL

• *www.dauntseys.org*

This page: everyday school experiences are key to inspiring future female engineers and scientists

Above: we have a key window of opportunity to interest girls in STEM subjects and careers