

FRIENDS OF THE SCOTSMAN /

It's not all oil and grease, girls – so why not plan an engineering career?

Like many people, I was struck by the beautiful, innovative design of the recently opened V & A Museum of Design in Dundee.

I've marvelled at the imagination and vision of the Japanese architect, Kengo Kuma, but, as an engineer, I'm more interested in the processes involved in making sure that Kuma's design could be translated into a functional building which people can enjoy and which doesn't topple into the River Tay!

As well as the architects, the project also needed consulting engineers. The chances are that most of the engineers working on the project were men, as only 9 per cent of professionally-registered engineers in the UK are women.

Engineers design, build and invent things that benefit society and almost everything around us has been engineered in some way. The laptop that I'm writing this piece on, the electricity to power it, my house, my car and even my clothes have all been engineered. So why, when the work they do has such a positive impact on society, are there so few female engineers?

As someone who transferred into engineering in my mid-30s, I've long been interested in understanding why such a creative, varied and well-paid career fails to attract more women. Most undergraduate degree engineering courses have around 16 per



Lecturer Carol Morris is on a mission to increase the number of young women entering the field

cent female students, although it varies by discipline, with only 10 per cent opting for mechanical engineering.

In Scotland, only 3 per cent of those on engineering apprenticeship programmes are women. There have been numerous initiatives over the last 30 years aimed at increasing the number of women in engineering, but many of these have been directed at 16-17 year old girls, and have had limited success because girls generally have fixed ideas about engineering by this age.

Recent research suggests that ideas about engineering are formed at a very young age and certainly before children leave primary education. A survey in 2017 by EngineeringUK found that twice as many girls as boys, aged 7-11, described engineering as 'too difficult' and nearly four times as many girls thought it was 'boring'.

Engineering was never suggested to me as a career when I was at school. Even if it had been, I would probably have thought that it was something to do with engines and involved lots of oil and grease. Even today, the misleading image of the engineer attired

in a high-vis jacket and safety helmet prevails and these misrepresentations can have a profound impact on subject and career choice.

My own research – involving interviews with mature female engineering students – reinforces the view that many girls are either not told about engineering as an attractive career, or are actively discouraged by parents and teachers.

The UK's Institution of Engineering and Technology found that toys with a science, technology, engineering or mathematics (STEM) focus were three times more likely to be targeted at boys than girls, so it's hardly surprising that girls don't consider engineering.

When asked why they were studying engineering, the most common response from my interviewees was that they wanted to make a difference to society. As engineers design and build things which benefit society, it is really important that the workforce reflects the diversity of today's society. The Scottish Government clearly recognises the vital contribution engineers make to Scotland's economic



↑ Catching girls young in considering a career in engineering is vital to improve the gender balance, as many teenagers develop fixed ideas about what the discipline could mean for them

prosperity and growth, so it was encouraging to read in their Programme for Scotland 2018-19 about the introduction of £20k bursaries to enable career changers in STEM to retrain as teachers.

There is also a commitment to 'improving the gender balance of those participating in STEM learning' and to ensure young people have high quality careers information.

I was saddened to read recently that a young girl was turned away from an engineering event by a careers advisor because it 'was for boys'.

Her mother took to Twitter to express her outrage and she was offered several opportunities to visit engineers in their workplaces, but deep-rooted gender bias like this impacts on the everyday lives of girls and can seriously affect their self-

confidence and aspirations. I hope that the Scottish Government's initiatives go some way to redressing the gender balance in engineering and perhaps there will be many female engineers working on Scotland's next iconic building.

If you would like to return to a career in STEM, you might like to try the free introductory-level online toolkit Reboot Your STEM Career

or the free advanced-level badged course, Returning to STEM, on the Open University's site OpenLearn. Carol Morris is a senior lecturer in engineering and innovation at the Open University. She was selected as one of the Top 50 Women in Engineering in 2018, by The Telegraph/Women's Engineering Society/Scottish Power, for her work on encouraging more women to study engineering.



Sowing the CeeD – how big data development will create opportunity for the Capital

Thomas Blyth reports on technology-driven improvements for business

Companies across the world are adopting high performance computing (HPC) and high performance data analytics to gain a competitive edge. There is a lot of hype around big data and big computing, but it is undeniable that data-driven innovation will have a profound influence on the business community in the coming years.

The expertise and support already available in Scotland will create a massive opportunity for our engineering and manufacturing sectors and the £500m Data-Driven Innovation strand of the Edinburgh and South-East Scotland City Region Deal means this is an exciting time for exploring how technology can benefit business.

Industry can therefore gain huge

benefits from the combination of data science expertise, HPC hardware, and readily-available software and data analytics tools.

HPC enables data scientists to manage, process and work with extremely large and complex datasets, which allows businesses to develop new products and generate new revenue streams.

EPCC is a world-leading HPC centre within the University of Edinburgh. It collaborates with companies of all sizes to tackle real-life problems or enhance business processes, and the direct results can include gaining a competitive advantage, reducing costs, or improving operational or research and development processes.

To understand just how much impact data-driven innovation can

have, consider the case of a manufacturing production line which is running 24 hours a day – an unexpected breakdown could turn out to be extremely costly.

A modern production line will generate a huge amount of data from sensors that detect faults. However, if machine learning could be used to predict faults before they occur, the number of times the line breaks down could be dramatically reduced, leading to massive savings.

This kind of application, in which powerful computers are needed to search for meaningful patterns in data sets in order to make predictions, will increase in importance as the amount of data grows.

The newly opened Bayes Centre in Edinburgh is home to a new

community of world-leading data science and artificial intelligence teams, including EPCC, and it is set to play a key role in delivering the £500m Data-Driven Innovation (DDI) strand of the Edinburgh and South-East Scotland City Region Deal.

Central to the DDI programme is an exciting new facility for the secure and trustworthy hosting and analysis of huge and varied datasets.

This £70 million investment in the World-Class Data Infrastructure (WCDI) will be fundamental in positioning the City Region as the data capital of Europe.

international datasets – will facilitate new products, services, and scientific studies.

The WCDDI's high-resiliency data and computing facilities will support work with complex, high volume, real-time datasets from across the City Region and beyond.

We are already seeing demand from a wide range of sectors including fintech and other financial services, space and satellite, data analytics, and tech start-ups. The establishment of this data hub and the production of new applications will in turn lead to new companies.

Here at EPCC, we see the WCDDI as a unique opportunity for companies to adopt data-driven innovation. It will offer state-of-the-art data and computer infrastructure, supported by data analytics and

modelling skills from across the University of Edinburgh and the wider region.

This begs the question – how can companies with no experience of data technologies take advantage of this?

Certainly, a collaborative approach is required, with the creation of new partnerships and bodies like CeeD – the Centre for Engineering Education and Development – hosting regular events that offer the opportunity to form new connections between business and academic researchers.

CeeD brings together large companies and their smaller supply chain partners, mixes in some world class academic expertise, such as EPCC, and combines the collective knowledge to improve operational effi-



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