

It's a Boy's Thing Really Isn't It? The factors affecting career choices amongst male and female engineers



Dr Susan Durbin - Centre for Employment Studies Research (CESR),
University of the West of England, Bristol

Sue.durbin@uwe.ac.uk

Entry into science, engineering and technology (SET) professions, where women's representation has remained stubbornly low, tends to follow several years of post-compulsory education and on-the-job and professional workplace training. While the low numbers of women in SET occupations have been well-documented and discussed (Evetts 1998; Fox and Stephan 2001, Herman *et al.* 2012; Durbin 2010) less has been written on the education and family circumstances of those who choose a career in engineering. Engineering has an image of a 'masculine' profession that is unsuitable for women as it is perceived as being 'tough, heavy and dirty' (Powell and Baglihole 2006). Various strategies to try to increase the numbers of women entering engineering education and employment have enjoyed limited success (Powell *et al.* 2008). This begs the question, why do some women choose a career in a profession that has both a negative image (Institute of Engineering and Technology 2008) and is one of the most male-dominated professions in the UK?

A report by the Institution of Engineering and Technology (2008) identifies several 'influencers' during the educational phase of those employed in science, technology, engineering and mathematics (STEM) professions, including teachers, who can offer advice to students intending to study STEM subjects, and parental influence when choosing subjects and a career in STEM (see also Dryburgh 1999). One of the problems of attracting and retaining people in STEM has been identified as poor careers advice at crucial stages, especially for those aged 11-14 and 16-18 years, when important GCSE and A-level choices are made. The report identifies the major barriers to boys and girls pursuing STEM subjects and careers as: a lack of 'quality teaching' for students to become and remain engaged in STEM; the perceived difficulty of STEM subjects by boys and girls and the negative views about success in, and unacceptable stereotypes about, STEM occupations. The subjects boys and girls study will also strongly influence the later careers they follow, physics being one of the key subjects for a career in STEM – just twenty per cent of all physics students are female (Institute of Physics 2012). This leads to the poor representation of girls in physics, denying them individual opportunities and contributing to the UK's shortage in STEM skills. One of the main influences on student's attitudes to physics is the teacher-student relationship in terms of the level of support the student received from their physics teacher. The report by the Institute of Physics claims that interventions in encouraging more girls to take physics can only be sustained if they go beyond the individual teacher and become part of a department or school-wide programme. The importance of education, careers advice and support should not, therefore, be underestimated.

This article is part of a wider study examining the educational backgrounds of seventeen engineers (eight men and nine women), seeking to understand how they became interested in engineering, the subjects they chose at school and any key individuals who influenced and encouraged/discouraged their career choices and, importantly, whether this was similar or different for men and women.

Findings

Interviewees were asked when they had first become interested in engineering. For male interviewees, initially it had been the A-level subjects in which they were most interested, namely maths and the sciences (physics, chemistry, biology). In turn, these A-level choices led interviewees to consider engineering, alongside other professions, as a future career. Some also chose to study non-science A-level subjects alongside maths and science, such as history, art and geography to keep their options open for the future. All male interviewees had studied physics and maths at A-level. For some, but not all, the choice of A-level subjects was clearly aligned with engineering:

"To go down the engineering route, it was clear to go for things like maths and physics and so I did maths and further maths and physics as my three A-levels."

(Interviewee A, male)

Engineering had not been the first career choice for the majority of male interviewees, alternatives ranging from truck driver, management consultant, the medical profession and academia, to air traffic controller and pilot. Just one interviewee, whose father had worked as an engineer, identified engineering as an interest from childhood.

All but one interviewee had attended a mixed comprehensive school where careers advice at the important O- and A-level stages was described as 'poor', 'limited' or 'non-existent', which could account for the level of uncertainty around career choices. One interviewee, who had been identified as having high potential in both maths and physics at school and has since been awarded both a degree and PhD in engineering, was given the following careers advice by his careers advisor at comprehensive school:

"Go and join the nearest factory and push buttons for the next thirty years."

(Interviewee F, male)

Fortunately, his father knew better:

"My father knew better and he said, 'no, you're going to stay on and do A-levels and see where it takes you'. And then it was not until I was 18 that my father and I sat down and said, right, what are the options? Maths, physics, engineering, and went forward from there. By the time I was 18, I decided what I would be doing

(Interviewee F, male)

Guidance and advice from teachers was also limited: just three interviewees identifying school teachers who had helped and encouraged their interest in the subjects they were studying, including some careers advice and offering extra help. The following interviewee summed up the general feeling on careers guidance at school:

"I could have done with more structured support, some help with my options, but I did it all on my own, helped by the people who influenced me [father, uncle, teacher]. The school simply provided prospectuses."

(Interviewee A, male)

Careers advice and support was generally provided by those outside of the education system, namely parents, relatives and members of family networks. The majority of interviewees cited their fathers as offering the most support, one whose father worked in an airport and an uncle in engineering production – both had been inspirational in terms of their actions, rather than offering structured careers advice.

Two interviewees identified fathers who had worked as engineers, one a qualified engineer, the other who worked in sales in an engineering company. A third interviewee had been influenced by a father who had been a pilot whilst a fourth had lived near an airport which had stimulated his interest in aeroplanes. Others mentioned fathers who, although following different career paths themselves, including truck driving, journalism, mathematics, farming and psychology, had supported the interviewee in his choice of career in engineering. Just one interviewee mentioned being influenced by his peer group in terms of A-level choices and one had become an engineer against his parents' wishes – his mother wanted him to be a medical doctor, his father to work in computing. The influence of parents on career choice was evidently important for these interviewees. While none of the interviewees felt they had been discouraged from pursuing a career in engineering, one explained how he had experienced backlash from wider family members, who had not been to university themselves. He was questioned about why he didn't want to go out and get a 'proper' job instead of studying for A-levels – he was the first in his family to go to university.

In summary, there was no 'burning desire' to be an engineer amongst this group of male interviewees. While most demonstrated an aptitude for and interest in maths and science subjects, most kept their options open in terms of future careers. Careers advice was very poor (although we need to bear in mind we are dealing with careers advice as it was around twenty years ago), as was help and advice from teachers. The main sources of support came from parents, especially fathers, who supported their son's choice of career.

Female interviewees, like their male counterparts, became interested in engineering through their interest in and passion for maths and science subjects at school, but for some, at a much earlier age, at primary school stage. One interviewee explained that this had grown from her interest in aviation – her father was an air traffic controller and the family home was near an airport where she would often observe aeroplanes taking off and landing. Two interviewees explained how, from primary school age, they had enjoyed 'constructing and taking things apart' (toasters, bikes, radios) while another had been influenced in her teens by her sister's university prospectuses that were left lying around the house. An aptitude for and interest in maths and sciences at an early age was usual amongst this group of women and this developed into an interest in engineering, especially around the time of choosing O-levels, which is earlier than for their male colleagues. Just two interviewees said that their interest in engineering began at the later, A-level stage.

For most, engineering had been their first career choice, despite consideration of other professions, such as medicine, psychiatry, art and psychology. Just one interviewee had seriously considered another profession, in psychology or medicine, and two others considered jobs related to engineering, i.e. air traffic controller and an aircraft engineer with the Royal Navy. A focused preference for a career in engineering stemmed from an interest in maths and sciences and other professions having a much longer period of study and training before becoming qualified. Seven of the nine had attended a mixed comprehensive school. Five of the nine

female interviewees had studied A-level physics, others studied chemistry, and biology, while a few studied subjects related to languages, art and history. All had studied A-level maths.

Like their male colleagues, female interviewees claimed that careers advice at school had been limited. For two interviewees, this comprised general advice on studying at university and completing a form that was fed through a

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computer. Three mentioned some support from maths teachers who had recognised their abilities in the subject, but for one interviewee, her interest in maths and sciences had lead her teachers to assume she should pursue a career 'suitable' for a woman while another was told that engineering would not be suitable for a woman. The first interviewee was told:

"With those subjects you could be a nurse', and I had no support from the school whatsoever."

(Interviewee P, female)

"People at school as well, even the careers advisor we all had to see when we were sixteen told me I couldn't possibly be an engineer because women didn't do that."

(Interviewee M, female)

A third interviewee (L) told how her headmistress, at an all-girls school, had refused to sign her UCCA form as she did not consider engineering a suitable career for women.

Two had attended talks on women in engineering, one at the age of fourteen and another during her sixth form studies:

"I think because that perception of engineering is, you know, being sort of knee deep in, elbows deep in grease was just something that, oh no, it's not gonna be for me but it wasn't like that at all and actually I learnt the subject was about using all the things I enjoyed doing and it was very, you know, it was the practical element that was really me as well."

(Interviewee Q, female)

Female interviewees generally felt that schooling was a reason for the lack of women in engineering, including poor quality teaching and poorly informed teachers who were not helping schoolchildren to make the right subject choices that would enable them to choose suitable university subjects. This was linked to the stereotype that boys are good at maths while girls are not, that girls at school were more attracted to subjects such as geography, history and languages and that they tended, generally, to do less well at maths and science. One interviewee felt that the kinds of women who did choose the maths and sciences and went on to study engineering at university would have three factors in common: a father who is an engineer; being non-conformist; and having the confidence to pursue engineering. Catching children during the early years in secondary school, before making their 'O' level or GCSE selections, was another popular view but there was also a recognition that well-informed careers advice was generally not available. It was felt that the stereotype that boys study maths and science while girls do not still prevailed today, especially at mixed schools.

One interviewee felt that even when girls did study maths and science, they often chose not to pursue this:

"Unless you're a child whose parents actively encourage you into engineering or you've got something like a teacher that's really knowledgeable and actively encouraging children in a particular school, I think it wouldn't necessarily occur to girls. I think there's no reason why girls can't be excellent engineers and I think often girls do very well at maths and science but then don't choose to continue with it for whatever reason, so I think that's where the problem has got to be tackled."

(Interviewee O, female)

Three interviewees' fathers and one interviewee's uncle had worked as engineers and one, although not a qualified engineer, had worked for an engineering company. Encouragement from family members varied for the female interviewees. For those whose fathers were engineers (no interviewees mentioned a mother who was an engineer) one said that she was generally helped to channel interests in the sciences, another that she developed an interest in aeroplanes from an early age as the family traveled a lot, while another mentioned an uncle with whom she would play Meccano when he visited. Another explained how she would shadow her father while he pursued his science-based personal hobbies at home, to which she felt she was naturally drawn. The professions of parents who were not engineers included teaching, the medical profession and accountancy.

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Some interviewees also explained how they had been discouraged from a career in engineering. One, whose father was an engineer had found her a summer job at his company, which she enjoyed immensely but when she finally decided on a career in engineering, this was met with a mixed response from her parents:

"My father was over the moon. I mean my father was always enormously supportive of me which is strange in a way because he was quite an old-fashioned guy..my mother had been quite a pioneer herself...but she's always been quite a girly girl and I think she didn't quite understand why I was doing this because I was going to have to wear scruffy clothes and working on machines and stuff like that, so she's never really, she's never been anti, but she's never been anything like as supportive as my dad."

(Interviewee L, female)

Another interviewee also mentioned that her mother had been discouraging as she was concerned that as an engineer, her daughter would struggle with handling work, family and children. There had also been pressure, for another interviewee, to become an accountant and follow in her parents' footsteps, although they were generally supportive of her career choice.

Discouragement from fathers, who did not want their daughters to become engineers, was mentioned by two interviewees – one whose father worked for a civil engineering company and did not want his daughter ‘working on building sites’, the other, the daughter of an air traffic controller who tried to steer her away from potential career choices as she identified these:

“I really liked airplanes and the best way to get to airplanes was by becoming an air hostess and my parents said, no, you can’t be that because you’ll just be a glorified waitress...then I decided I wanted to be an airline pilot, when I got a bit more savvy, and my dad said, you’ll just be a glorified bus driver, so you’ll see a pattern emerge here from my dad and my career choices.”

(Interviewee K, female)

Discouragement from other family members, was also mentioned by one interviewee:

“There were a lot of comments about why on earth would you want to do that? That’s not a girl’s subject and why would you want to have...you know, dirty fingernails for the rest of your life? That sort of thing, so yeah, I had a lot of that.”

(Interviewee Q, female)

Conclusions

Understanding the educational backgrounds of those who choose a career in engineering offers some insights into why men and women choose this career path. It also helps to explain why there are so few women in engineering, where cultural and gender stereotypes are played out from the critical formative years, when very little help and support from teachers and careers advisers is available, through to the workplace. While, in some cases, positive role models have helped women to make their choices, others have experienced discouragement due to engineering not being viewed as an ‘acceptable’ career for a woman. Despite this, the small sample of women who did take up engineering, decided early on that they were going to do so, and were more focused in their educational and career choices than their male colleagues, who took longer to decide upon a similar career path. Careers advice and help and support from teachers was virtually non-existent for both men and women in the sample, and this was exacerbated for some women who were advised not to pursue a profession that was unsuitable for a woman, stereotypes that their male colleagues did not have to deal with.

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As long as the sentiment expressed by a the senior male engineer cited below persists (when asked why he thought there was so few women engineers in the UK) this will serve to reinforce the stereotypes women continue to face:

“It’s a boy’s thing really, isn’t it?”

(Interviewee B, male)

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