Teaching the Human Side of Engineering

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Engineers often have a narrow view of what constitutes "real" engineering and most of what they actually do is something else entirely. Engineers like to think of engineering as problem-solving, calculation and design – hard technical stuff they learned in engineering school.

Yet this is not what they do most of the time. Our research, based on interviews with nearly 100 engineers in several countries across all disciplines, has shown that engineers spend most of their time interacting with other people – engineers, technicians, clients, contractors and suppliers. Coordinating technical work by other people dominates engineering practice. Engineers nearly always have to rely on other people to deliver the value that results from their work, while at the same time taking responsibility for the consequences (see previous article “The intertwined threads of work” in the February issue of *Engineers Australia* magazine).

The amount of time spent interacting with people could be explained in terms of engineers taking on management roles as they progress in their careers. However, a systematic study of our own engineering graduates just a few months out reveals that they also spend most of their time interacting with other people. Purely technical work like design is a small proportion of their daily effort.

However, examination of the content of typical engineering courses reveals around 90% or more focuses entirely on analysis of objects, scientific principles and mathematics. The other 10% covers design and a little economics. Serious consideration of the human being that lies at the heart of engineering is conspicuously absent. If it receives any treatment at all, it is likely to be regarded as “a soft option”, something that students should be discouraged from taking as opposed to the “hard” technical stuff.

This is in contrast to the view of engineers we have interviewed who see the technical part as easy, but getting people aligned and cooperating with each other as the really hard part of engineering.

Changes to accreditation criteria in 2000 required engineering schools to pay more attention to communication and team working skills.

Engineering schools typically interpret the need for communication skills in terms of the ability to present technical papers at a research conference.

Team skills are said to be developed by dividing students into groups (called teams). However, student groups rarely behave like teams. It is rare for engineering students to learn formal team working skills in their courses.

We need to provide graduates with formal concepts and ideas about human behaviour, including self awareness. They need to learn about effective ways to compensate for inevitable variations of human perception and behaviours so they can practise engineering and deliver results with predictable performance, timescale, cost, safety and environmental impact.

At the moment, nearly everything that an engineer needs in practice such as understanding the human side of engineering has to be learned after graduation, mostly on the job from colleagues, with minimal formal introduction. Yet, we would not recognise an engineering qualification on the assumption that graduates would learn the scientific and technical essentials on the job.

There is a need to bring serious consideration of human behaviour to the centre of engineering in engineering schools. While such a transformation of engineering education will not be easy, it might encourage many more young people to take up an engineering career with a much clearer idea of what lies ahead.

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