BIZCOMMUNITY

Engineers don't just build things, they can help save the world

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Engineers like to claim their primacy as problem solvers. But while this ability will always be critical for engineers, there is more to engineering than just solving problems.

Engineering careers have become highly diverse over the past 50 years. They are now tackling complex social issues such as poverty, inequality, disaster recovery or climate change. Their work is in mega cities and small towns, remote communities and in both high and low-income countries.

But universities still need to catch up with this new reality. A mission to improve the living conditions of the least privileged citizens of the world - in Australia and overseas - seems to be almost entirely absent from engineering education in Australia.

Why women avoid engineering

Serious engagement with the bigger social challenges, locally and globally, might be just what some highly motivated students are missing in this field. It could be one of the reasons why some potential students, especially women, choose to avoid engineering as a career option.

Some disciplines, such as biomedical engineering, have clearly articulated their links to enhancing human lives and, at the University of Sydney at least, do attract many female students.

But that's not the case in other areas of engineering study, where the proportion of female students is as low as 14%, despite women making up about 55% of all undergraduate students in Australia.

Engineering educators should make sure that students understand that, as future engineers, they can go beyond just learning how to design and build things. We need them to understand that engineering is also about dealing with issues of public interest.

We need to attract students interested in problems such as those faced by people living in slums in Manila, refugee camps in Jordan and remote communities in Australia. For this to happen, engineering teaching should include more content addressing such issues, including topics that have been traditionally in the domain of social sciences.

A joint team of local and international students and practitioners analyse results of their training and survey of resource-conserving technologies in Bandar Lampung, Indonesia. Shota Yamaguchi, Author provided

Ideally, engineering degrees should give students who are interested in these issues the opportunity to directly learn from people living in these areas by interacting with them. Such experience should include project-based work directly connected to theoretical content provided in the classroom.

Don't patronise

We need to avoid two types of risks when developing new formats of engineering education with global social issues at their heart.

First, the curriculum should not be framed as "engineering for poor people who cannot help themselves".

A survey commissioned by the University of Sydney showed that words such as "humanitarian engineering" resonate well with Australian students. But they are less attractive to international students, many of whom understand the conditions in developing countries first hand.

A student from India might be interested in more contextually relevant education for work in her home country but would not necessarily consider work in India as "humanitarian".

It is important that a curriculum tackling global challenges that are of concern to many nationalities should not simply reflect a first world view of world affairs.

Inhabitants of Arsi Zone, Ethiopia, have had mobile phones donated to them in an effort to improve information exchange and education over vast areas without adequate infrastructure. The is a training session on how to use new communication technologies. Ayako Ishiwata, Author provided

Second, the curriculum should not be limited to teaching technically-focused design in a low-income or disaster context. It should go beyond courses on how to design water pipes for slums, low-cost housing or sanitation.

From a technical viewpoint, the laws governing water flow in pipes are the same regardless of geographical location or the income of users and are routinely learnt by engineering students.

When dealing with water supply in slums, to continue with this example, what engineering students need to understand are ways in which slum dwellers in a particular city quarter access and use water in their everyday lives.

What are the power relations inside their communities and households that may give preferential water access to some individuals at the expense of others? What roles do local and central governments play in helping or obstructing universal water access?

Local residents of Tanggamus District, Indonesia, explain their transportation needs to Petr Matous (right). Ayu Pratiwi, Author provided

An engineer who is driven not only by technical know-how but also by considerations of social impact and political feasibility will be more effective in helping to develop smart, long-lasting solutions.

We need potential students to understand that engineering is about making lives better. We also need to make a conscious effort in our degree programs to provide students with an understanding of the living conditions of those who need engineering most - those without adequate shelter and/or suitable access to water, food, energy and sanitation.

If we don't, not only would we be restricting our efforts to rich-country problems, we would be depriving some of our most highly motivated students from the opportunity to apply their talents to the most pressing problems of all.

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