

## Chapter 4

# Engineers for Industry: Challenges, Solutions, and Future Ideas

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### ABSTRACT

*The need for a reliable supply of engineering talent is accepted globally, but in many parts of the world the many challenges mean that this is not easily achieved. Even if the graduate supply is a reality, often there are concerns about the quality of the engineers entering the workforce. This chapter will explore this landscape, and after identifying the many challenges, explore solutions and potential ideas for the future of engineering education and the university/industry collaboration.*

### INTRODUCTION

The current environment in which engineering educators are operating is both complex and demanding. The particular context explored within this paper is the UK, although a more global perspective will be taken wherever possible. The needs of industry are a primary driver when it comes to developments in engineering education, but increasingly the policies of government and the forces of the tertiary education marketplace are adding to this complicated picture (Perkins, 2013).

This paper will discuss some of the ways in which UK higher education institutions are addressing these challenges. Although the primary focus of the work will be the present, the paper will conclude with some more strategic thinking, contemplating what can be done to create a more robust foundation on which to build future innovation. Throughout, the key theme will be the employability of the engineering graduates being created and nurtured within the engineering education process.

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## **BACKGROUND**

Tertiary education, not just in the UK but across the globe, is in a state of continual change – whether that be rationalisation to balance budgets as has happened over much of Europe in recent years, the changing demands of students or the need to innovate to ensure the development of industry ready graduates. This paints a complex picture and engineering educators are firmly situated at the centre of this change.

If we consider the UK, all of the previously mentioned forces are acting on the higher education sector along with pressure to ensure that the student experience is of the highest quality. In the UK this is captured by the annual National Student Survey that all final year students in every university are asked to respond to (HEFCE, 2017a). The results of this survey are crucial as they contribute a significant amount to the University League Table rankings that are published annually and in this last year the award of recognition by way of the Teaching Excellence Framework (TEF) (HEFCE, 2017b).

In order to create a ‘Sustainable Future for Higher Education’ (UK Government, 2010), legislation led to undergraduate student fees being raised from £3000 per year of study to £9000. With the arrival of the TEF, these fees will now increase further and this was demonstrated in 2017 when fees were raised to £9250. The Government White Paper that introduced the TEF in May 2016, ‘Success as a Knowledge Economy’ (UK Government, 2016), made many proposals all with the aim that “universities should produce well equipped students ready to contribute to society and business”. Clearly employability is at the forefront of current UK Government thinking when it comes to the value and impact of Higher Education. This was taken further in the autumn of 2017 when the UK Government published its future plans for the TEF (UK Government, 2017). Although still called the TEF, the full title going forward is ‘Teaching Excellence and Student Outcomes Framework’ thus placing the future destination of university graduates firmly at the centre of the evaluation exercise.

The TEF has been perceived in some circles as yet another measure and a way to interfere in university learning and teaching. Taking a more optimistic and constructive view, it really should be seen as an opportunity. With the framework subjecting learning and teaching to a similar level of scrutiny as is already done for university research, the value of teaching professionals and the contribution they make is sure to rise.

## **STEM (SCIENCE, TECHNOLOGY, ENGINEERING, MATHS) GRADUATES**

So, in thinking about STEM graduates, exactly what does industry want?

In one word – everything!

They want a sound technical background but also a wide range of interpersonal, personal and business skills to supplement that STEM understanding. Also, they are not always consistent. Sometimes one area is valued more than another and this will vary from company to company.

Despite the ‘demands’ industry often places on universities and the criticism that is sometimes levelled at them concerning the quality of the graduates being produced, industry engagement in the educational process can be very variable. It is almost as though there is a reluctance to get too involved, as in it not being their responsibility.

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