Making Friends in Industry

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As an academic (and mechanical engineer) who has worked in the area of knowledge transfer for nearly 30 years, both in consultancy and KTP-type projects, I feel able to make a few comments and observations. These will be mostly in the area of relationships.

Many will have heard that an engineer is said to be "someone who can do for a dollar, what any fool can do for 10". In that sense, all of what follows may seem comparatively obvious. It is also true however that a good solution to a problem or a design solution will look obvious (once it is seen) and the importance of some underlying factors can be overlooked.

This article will therefore:

- Present a few reflections on university teaching. This is because in talking about relationships with industry, it's important to note what is relating to what! Students and academia have both changed. Industry has also changed profoundly over the years.
- Provide a few examples of collaborations. There have been lots over the years in terms of student projects, placements, KTP, FUSION and so on. The examples are fairly typical but are chosen in order to underline some lessons learned.
- Conclude with some overall comments to draw things together and make a couple of observations about the future.

Firstly, a little about the current university teaching environment (and we will not even mention underfunding and such aspects etc.)! It is interesting to consider what industry wants from young graduates. We tend to form opinions here based on our own experiences and perspectives, but it is important to recognise that both students and the education system have changed profoundly so an objective look is called for.

Figure 1 is from a recent survey from the Royal Academy of Engineering. In addition, we already have a skills agenda from Leitch, and statements from CBI valuing things like entrepreneurship, leadership, team working, etc. These agendas are therefore coming into university curricula. But a survey of industry

shows that industry wants..... "students who can actually do something".

However, students have changed over the years and their capacity for problem solving and for sustained individual study has also changed. These attributes need to be developed at university.

Also, those of us who graduated in the 70's and 80's can recognise that our engineering formation was probably deficient in terms of practical skills and we needed early mentoring and training on top of our degrees to make us useful in industry.

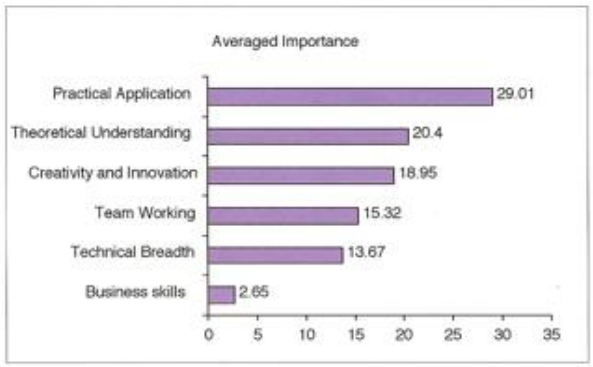

Figure 1 - From "Educating engineers for the 21st Century", Royal Academy of Engineering, June 2007

An engineer has to recognise in the practical situation that there is seldom a unique correct answer and that practical solutions are often compromise. This can be in stark conflict to the university experience where precise and accurate solutions to tutorial and examination assignments are required.

Most engineers will therefore recognise the value of their first big mistake! When they survive this (we call it experience) and develop confidence to move forward they have taken a major step in their professional formation. In today's situation a student placement undoubtedly helps immeasurably and we see this is in the employability of graduates who have had this benefit.

The issues run deeper however. Students will no longer suffer lots of foundational stuff. At university

we used to be told that the foundations were essential underpinning to the "fun" stuff.

Also, students may tend to run away from difficulties instead of investing the time struggling with a problem (these are generalisations). It is not all bad however. Students seem to be more values- driven and not motivated by money or sense of duty. We need to adapt our teaching approaches in order to be successful, improve retention, and meet the needs of industry. Consequently we find it beneficial now to begin with application and subsequently "seduce" them with the relevant theory.

For example, whereas we used to deliver design teaching using calculators and drawing boards we now can form students in groups and effectively put across the same principles by asking them to engage in competition to get a cordless power drill the length of a sports hall in the minimum time (see figure 2)!

Figure 2: Cordless drill drag racers

This provides opportunities for them to make mistakes (safely), to develop practical skills, and so on. However, running such projects necessitates imagination and courage on the part of lecturing staff as well as being prepared to relate to students in different ways.

There now follows a few examples of carrying a practical problem-solving disposition into industry and a few lessons learned. Overall, the message is still about relationships since most KT practitioners will be aware of the primacy of good working relationships with industry colleagues to ensure project success.

Figure 3 illustrates two lessons. Firstly, that things are not always what they seem! As a result of a KTP project the traditional Irish bar shown was initially computer simulated and subsequently manufactured using sophisticated CNC machinery with full integration with costing and scheduling.

The second lesson is that there are enormous opportunities for engineers to take their practical problem solving skills and apply them in a variety of unfamiliar (not

traditional engineering) contexts. We need to be sensitive to such opportunities, particularly as some "traditional" engineering activity leaves these shores, and to have the confidence to address them.

Figure 4 illustrates another KTP programme which generated a number of projects at undergraduate level. It was interesting to see the degree to which students responded to these projects and also the degree to which they DON'T necessarily respond in the same way to projects in companies promising potential employment, and so on. They want to make a difference. This example also further illustrates the message above about there being opportunities for engineers to move across industry sectors.

Figure 3: an Irish Theme Pub

Some interesting (and more directly mechanical engineering oriented) products are shown in figure 5. These are very successfully produced by a company in County Donegal and there have been students and postgraduates doing a number of projects on these products. Whilst the relationship here provided CAD and established the company's design capability, the major benefit was in terms of development of people.

Young, capable graduates found confidence to take practical design work forward. The academic partner did not actually design the modifications to the crane, rather supervised others doing it and mentored them in their professional development. The relationship gave the company confidence to exercise expertise that was already there to an extent and also to begin to employ graduates beneficially.

Figure 4: Support furniture

Many other examples could be given. The recent trends have been increasingly towards cost saving measures (obviously) as well as environment-related topics. It is important to admit that the benefits of KT activity are mutual. Often the focus is on direct and quantifiable benefits to the industrial partner. However, as well as considerable enriching the student and young graduate experience there is also considerable benefit to university staff.

Figure 5

Whilst the ethos is to "transfer" knowledge outwards to industry, there is great return in terms of experience and in seeing practical application of the knowledge. Also, it is true that, due to fast moving technology developments alongside funding implications, we no longer can "lead" industry all the time where technology is concerned. In this area of "tech transfer", sometimes it can be the technology getting transferred into the university!

It is seen then that the KT message is not necessarily just about technical competence. It is also about confidence and about RELATIONSHIP. Whether it is:

- With the company - all these projects only work well with good working relationships and partnership. In this way, two way transfer and benefit is achieved.
- With the student/graduate in mentoring context.
- Or even with the customer or supplier.

This is a vital message where traditional activities and markets have been moving to lower cost labour areas. To further underline these points, consider the example of purchasing a car. In the 70's important considerations were things like reliability, cost and availability of spare parts, value for money, and so on. The inclusion of a radio, heated rear screen or fabric covered seats were significant selling points.

In contrast, today we have expectations over performance and reliability. They are taken for granted and vehicles that fail to deliver will not be successful. The question becomes one of WHY do we purchase a particular model, and why do we tolerate variations in price?

The answers lie in two factors. Brand perception and personal preferences are an influence and DESIGN is therefore a major competitive element. The other factor is RELATIONSHIP. A person will purchase a car more readily from a dealer that appears to offer better and more personal service, or where they actually trust and feel and affinity with the salesperson.

Thus, in an intensely competitive market, where only one product can be the cheapest, design and relationship are the main differentiating competitive elements.

Having digressed slightly, we now make a couple of summarising and concluding comments:

- This article has sought to make the point about the importance of good relationships in the context of KT activity. KT projects are often not so much just about transfer of knowledge, but rather a voyage of mutual discovery. It is sometimes difficult to assess who benefits more, although it is generally accepted that the programmes add very substantially to employment and to the bottom lines of the participating companies. Mentoring and personal development is also a very important aspect.
- We need to recognise also the present context where, despite recessionary pressures, companies are finding increasing difficulty in recruiting. Technology transfer schemes such as KTP and FUSION (Ireland) are a means to enhance recruitment as well as getting the project done. They are a means of customising a young graduate to the needs of a particular company. Both FUSION and KTP must be continued, profiled and improved.

- We have hopefully illustrated the need for universities to adapt and develop course provisions, and this ought to be ongoing. However, recruitment to engineering is still difficult. We believe that companies increasingly will have to partner with universities to provide more prizes, bursaries and sponsorships.
- Work-based qualifications are becoming more attractive to companies and to students. Students themselves will increasingly recognise the desirability of CPD opportunities. They tend to be more loyal to profession than to company in these days and so will go to, and stay with, companies that "do them good" in CPD and experience terms. Professional bodies need to update their image/approach and to seek to make CEng valuable/valued.

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