

An Industrial Perspective on Working Together to Develop the Chemical Engineering Curriculum

Alan Hall, Chemical Engineer with Syngenta, June 2008

This case study describes how Syngenta has been involved with chemical engineering departments in several universities, including Loughborough, with a particular focus on group design projects.

Reasons for engagement

Over the past 10 years or more, there has been a general willingness within the company to 'foster academic relations' for both research and teaching purposes. The research probably came first, but over the course of general discussions, the content of the undergraduate curriculum was raised and this led to universities saying 'come and help us do something about it'. This resulted in cases where the company works with the same member of staff (for example, Chris Rielly at Loughborough) for both research projects and teaching engagement.

It was felt that chemical engineering undergraduate courses were mainly focused at large tonnage continuous type processing, for example; petrochemical plants, and that teaching in the fine chemicals type of technology design was lacking. The company worked with two universities to help them develop fine chemicals modules for their final year students. This evolved into not just helping them with planning the course content but also delivering some of the course.

The engagement

One particular example of being involved with delivering some of the course

is through group design projects at three separate universities with final year undergraduate students usually in groups of 6 to 8. In each case, a design brief was set for an existing plant using an existing process. A relatively small amount of information was provided to students at the outset and they were then actively encouraged to ask the industrialists questions to seek further information – much of which wasn't in the public domain. They were able to get a certain amount of information from doing literature searches but also **had** to approach an industrialist for specific information. It is felt that a key feature of this type of engagement was that not everything was offered up front but instead the industrialists visited the University involved and worked with small groups, encouraging them to talk about the project.

The design project lasted for about a ten week period, with the industrialists going in at the beginning to give the background and to specify the problem, a couple of visits in the middle to check progress and then a final visit at the end to listen to the students presentations. In some cases a site visit was also included.

If the company was involved in observing final presentations, an opinion and feedback was offered to the University staff involved but they were not involved directly in the final assessment. Students looked for the company representatives to ask questions and give feedback during the presentations, probably resulting from the rapport built up between the industrialists and students in the course of the project.

Issues

One obvious drawback of the above approach is that the students often think of their questions in between the planned visits. Tackling this through email has been attempted but this can often be difficult to operate in practice. A more successful solution recently at Loughborough with Chris Rielly, was for Chris to filter all the email so all the requests came from Chris and could be tracked and monitored by him.

Currently, another more generic issue is that as a large company, it used to be relatively easy to be able to commit a certain amount of resources, which wasn't a huge amount of resources, to allow people to attend meetings with universities and encourage them to think about our type of technology. This is getting more difficult nowadays as companies become leaner. The benefits for the company are at a relatively high strategic level (influencing undergraduate teaching) and questions are asked – “you are going to Loughborough for the day today, what's that about?” “I think finding the resources is probably more difficult than what it was”.

Another big issue is that when you engage with universities you have got to make sure your expectations match up. For example, during an MSc project with a University, data was provided to do some analysis and after discussion it was agreed that we would return a couple of months later expecting some results. With expectations high, the company sent four people to

the University only to find on arrival that the supervisor was too busy to attend and that the student hadn't finished his report. The experience was awful and the company got almost nothing out of it. However, although it was easy to blame the University initially, on reflection, the company were as responsible as obviously the time hadn't been taken on both sides to agree expectations. From the University perspective they regarded it as a very ad hoc informal thing while from the company viewpoint, they attended a meeting expecting to be presented with results. So, “share expectations making sure everybody is clear about what they want”.

Benefits

One of the key benefits for both the students and for the industrialists involved was the opportunity for the students to ask questions and to learn from one another in small group discussions. From the industrialist's point of view in particular, there is no better way of improving your understanding of something than trying to explain to someone else why it's done like that, especially someone who is far removed from it. “It's one thing explaining it to a colleague but to explain it to an undergraduate, its quite a good discipline, this is one of the benefits to industry it develops people, encourages them to have a wider network and context.”

An additional advantage of small group teaching is that it is easier to overcome any mismatch of expectations in the material being delivered. It is important that industrialists are well briefed and made absolutely clear how about how their teaching fits into the overall modules and context of the curriculum. In addition, having students come to the workplace is a good way of teaching them about what the company does and has benefits from both perspectives. The drawback is that you can only do that with relatively small groups.

Academic/Industrialist/Student perspective

The initial purpose of the engagement was all about trying to encourage the universities to change to some extent their undergraduate teaching content and to introduce the fine chemicals module. To a large extent, it is understood that this change has now happened.

Reflections

From this experience of engagement with undergraduate teaching, it is felt that being involved with small groups of students through a group exercise or workshop is the best approach for an industrialist. Stimulating discussion in more informal group settings was found to be much more satisfying from all perspectives. This involvement with teaching was part of a broader engagement with the universities including PhD Case awards, masters projects and industrial placements.

Good communication between the academic and industrialist was also found to be key – preparing the industrialist well for coming into the University. For example, on one particular occasion, I went to deliver a lecture anticipating about 20 students and when I got to the lecture theatre there were 90. I found that really quite unsatisfactory because with a group of that size you are just standing there and delivering material, it is very much one way, you don't get the feedback and the discussion. I didn't enjoy that and wasn't sure the students enjoyed it much either, sitting and listening for 2 hours!

Supporting information

Alan Hall is a Visiting Professor in Chemical Engineering at Loughborough. He has taught on MSc modules and design projects at Loughborough, Birmingham, Imperial College and UMIST/Manchester University.

Syngenta is a world-leading agribusiness committed to sustainable agriculture through innovative research and technology. The company is a leader in crop protection and ranks third in the high-value commercial seeds market. Syngenta employ some 19,000 people in over 90 countries with nearly 3,000 employees in the UK and Ireland www.syngenta.com.

Over the period this case study covers the company has changed significantly from being ICI to Zeneca and now Syngenta. ICI was a huge multinational company based in the UK and it was easy for them to support people in doing academic liaison. In comparison, Syngenta is much more geographically diverse with a comparatively small process technology organisation in the UK so it is more difficult to find resources to support teaching in engineering.

