FELLOWS IN TEACHING AND ACADEMIC DEVELOPMENT 2009-2011

Critical thinking in Science Engineering and Technology

Personal statement

I believe critical thinking is an important graduate attribute but one that is hard to define and to understand. It is with a desire to have a greater understanding of what critical thinking means to lecturers, students and engineers that I have embarked upon this study.

Background

Critical thinking in engineering is viewed as being very important given that engineers need innovative approaches to tackle real-world issues such as provision of sustainable transport infrastructure or clean water supplies (Felder, 1997). Engineers are decision-makers, and hugely influential when it comes to how our society will function and be shaped in the future. Engineers can influence how we travel, what our cities look like, how our environment is protected and how we communicate.

Critical thinking must be seen as a skill that is necessary for engineers to be able to engage in good problem solving where they are sensitive to the context of the problems they are solving (Siller, 2001).

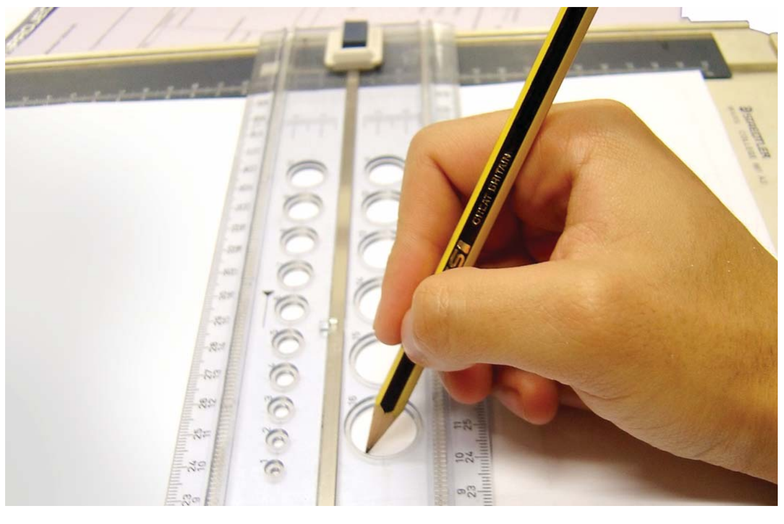
Siller (2001) points out that engineers nowadays do not have just have to deal with facts and figures, but must also be able to take account of the societal issues relating to their decisions. For example, when designing new transport infrastructure, engineers need to be able to consider that design in terms of its impacts on the environment, on sustainability, on travel patterns and climate change and on social factors and its impact on social exclusion of members of society. This means that for engineers there is greater uncertainty in their decision-making and a need for more critical and reflective judgement when they make decisions (Siller, 2001).

The Project

This individual project will focus on the importance of critical thinking in engineering and technology. Already, in the University there have been are significant changes in how engineering is taught, with a greater emphasis on cooperative learning, problem based learning and ensuring students engage in meaningful learning activities in order to encourage more critical and reflective thinking.

However, we need to know if we are engendering critical thinking in our students and if employers of engineers see this as an important skill in graduates. Engineering and technology are seen as being vital by this government for the economic recovery of Ireland and there are great expectations being placed on this sector as something that can bring about new and sustainable economic growth. We are told that to attract the best employers we need to produce more engineers and scientists with better numeracy skills and that without these graduates our economy will not recover.

Therefore, it is extremely important to understand what it is that employers in this sector view as being important attributes and skills for engineers to hold. We need to understand what employers like Microsoft and Google need from their employees and if we, as universities, are providing them with graduates who are equipped with the correct skills to work in highly technical positions. What graduate attributes do they view as being important? Is critical thinking something they want in their employees?



Methodology

In the first stage, contact will be made with employers through the professional body, Engineers Ireland, and employers will be asked to complete a short survey about the graduate attributes that they feel are important for engineers.

Following from this, a number of employees will be selected from each of the engineering sectors to ensure that all engineering sectors are covered. These employees will be asked to participate in an interview that will discuss their views on all graduate attributes and on critical thinking in particular.

In those interviews, an attempt will be made to discover how employees actually define critical thinking and if they view it to be important for their employees, and finally if they feel that graduates possess the graduate attributes, including critical thinking, that are important.

In addition, interviewees will be questioned about they attempt to improve the skills of their employees.

This individual project will make an important contribution to our understanding of the importance placed by employers on graduate attributes and critical thinking in the science and technology sector. The results of these employers' interviews will be analysed in the context of the findings of the group project, where we will be able to see if the desires of the employer are matched by what the university is striving to do.

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