

CRITICAL THINKING IN THE UNIVERSITY CURRICULUM

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Abstract: This paper describes a multi-qualitative study undertaken to examine the issue of critical thinking as a graduate attribute. Critical thinking is a graduate attribute that many courses claim to produce in students. However, it is important to understand how academics define and describe critical thinking and whether their understandings of critical thinking differ, depending on their discipline or subject area.

The paper describes a series of in-depth, semi-structured interviews with academics involved in teaching and learning in a number of disciplines, including engineering. The objective of these interviews is to look at how different disciplines define critical thinking and how they teach critical thinking in their courses. In addition the paper describes how a selection of modules particularly concerned with the acquisition and development of critical thinking will be chosen, and the interviews that will be carried out with module coordinators about the module design and assessment, recognition and measurement of critical thinking.

Keywords; symposium, engineering education, transformation, unsustainable, society, international.

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1. INTRODUCTION

There is currently considerable interest in the generic attributes of graduates (Jones 2009), particularly critical thinking, and considerable discussion about the precise meaning of the term (Barrie 2006, Jones 2007). There has, however, been relatively little investigation into the relationship between disciplines or subject areas and the concept of critical thinking (Jones 2007, 2009) and how it is realised and recognised through curriculum and pedagogy (Jones 2009,

Maton 2009). This study attempts to rectify this by embarking on a large-scale examination of the views and perspectives of academics, students and employers regarding critical thinking and its importance.

Given the increasing emphasis on the ability of universities to clarify the nature of the education they provide and the contribution of their graduates to society, it is important that they can describe the quality of their graduates in ways that are meaningful to a wide range of stakeholders, including employers, professional groups and policy makers (Barrie 2006). However, in order to avoid decontextualising attributes such as critical thinking, it is important that they are understood within specific disciplinary or subject contexts and that academics have a shared understanding of the concept and of the teaching and learning strategies that support its acquisition. It is also important that students understand what is expected of them in relation to graduate attributes such as critical thinking and that assessment strategies are designed to determine the degree to which it has been acquired. In addition, it is extremely important in the given economic climate to understand how employers view critical thinking and if there is some cohesion between what universities strive to produce in their graduates and what employers want to see.

This paper describes a study currently being carried out that strives to examine how critical thinking is viewed by academics and how it is instilled in students, how it is understood by students and whether they have achieved some level of critical thinking in their time at university and how employers view and rate critical thinking as a graduate attribute. The study is still taking place and therefore this paper will describe the methodology employed and initial, preliminary findings.

The aim of this study is to explore the understanding and realisations of critical thinking in the university curriculum and in the world outside university. The objectives are as follows:

- To discover what are the understanding and views held by academics in variety of disciplines regarding critical thinking as a graduate attribute.
- To find out if academics' understanding of critical thinking is influenced by their own discipline and to assess if there are differences between disciplines in how they view critical thinking and rate its importance.
- To examine if critical thinking is built into university curricula and modules and if it is possible to in some way measure the achievement of critical thinking in university students.
- Finally, to examine how the world outside university, in the form of employers, understand, define and rate critical thinking. Do employers want critical thinkers and are universities producing the graduates that employers require?

2. METHODOLOGY

2.1 Introduction

The study has been designed to comprise of several layers. It is a qualitative study where a number of in-depth, unstructured interviews have been and will be carried out with academics and employers. This work will be supplemented by a documentary analysis of students' work. There are a number of steps to the work, as set out in Table 1. Each step will now be described.

Methodology:
Step 1: Contact with Heads of School and interviews with their nominees about critical thinking in different disciplines
Step 2: Analysis of modules and module descriptors Documentary analysis of the work of students in related module descriptors
Step 4: Interviews with employers

Table 1 Methodology employed

2.2 Interviews with academics regarding critical thinking

A major objective of this study was to discover what are the understanding and views held by academics in variety of disciplines regarding critical thinking as a graduate attribute. Therefore, a series of semi-structured interviews was carried out with academics from a range of disciplines in order to determine how they defined critical thinking, to gain understanding of critical thinking both as a generic and a discipline or subject based attribute. The sampling was purposive and snowball, access to all participants and documentary materials was negotiated first through Heads of School and then their nominees.

The following disciplines were selected:

Discipline	Arts/Science	Professional – Y/N
Chemistry	Science	N
Agricultural Science	Science	N
Mathematical Sciences	Science	N
Architecture and Civil Engineering	Science	Y
Physics	Science	N
Mechanical Engineering	Science	Y
Economics	Arts	N
Sociology	Arts	N
Social Justice	Arts	N
Business	Arts	N
History	Arts	N
English	Arts	N
Law	Arts	Y

Table 2 Academics interviewed

These were selected to reflect both professional and non-professional disciplines and also to ensure that we had a range of science-based and arts-based disciplines. It was felt that this selection would give a wide range of view points and would allow us to compare the differences and similarities between disciplines with regard to critical thinking.

For each of these disciplines, the head of the school in which that discipline was located was contacted and asked to nominate a person from within their school who would be willing to speak to us about critical thinking and who had an interest in developing teaching and learning within that school. The nominees were then contacted and asked if they would be willing to act as a representative of their discipline to discuss their understandings of critical thinking as both a generic and discipline specific attribute.

Interviews were conducted in March and April of this year and were in-depth and semi-structured. The interviews have lasted approximately one hour in each case and in those interviews academics were asked about how they defined critical thinking, in particular in relation to their own discipline. In addition, the participants were asked to set out how their views tied in with the views of others in their discipline and if they thought others in their discipline were aware of definitions and concepts surrounding critical thinking.

Interviewees were then asked about whether they felt that critical thinking was important for their graduates and how it ranked when compared to the other skills that they might require to be competent graduates.

Interviewees were asked to consider if they felt students became critical thinkers when in the university and how they ensured that happened in their courses. They were asked to consider if critical thinking was addressed explicitly in the curriculum and if module learning outcomes really addressed the issue of critical thinking. They were also asked how they assessed and measured critical thinking, and if they felt that it was really possible to assess and measure critical thinking realistically.

Finally, interviewees were asked about the students on their course and whether they felt those students were aware of what critical thinking was. Were students made aware of definitions of critical thinking and did the students, in their view, hold it to be an important attribute.

At the end of the interview, interviewees were asked to nominate one or two modules which demonstrated critical thinking being developed in students.

Some interviews have already taken place and all will be completed by the

2.3 Analysis of modules descriptors

The next stage of this project will commence in April for those interviews that have taken place and will be completed by the end of this summer. Documentary sampling is of 2 module descriptors nominated by each module co-ordinators, their associated assessment tasks, any other relevant module materials the co-ordinator wishes to provide and the anonymised responses of 3 students to the module's assessment tasks (one from each of the upper, middle and lower achievement ranges). Once selected by the module co-ordinator as falling into the upper, middle or lower ranges of achievement on these tasks, 3 students per module will be invited to consent to their anonymised responses to the assessment tasks being made available for the researchers.

Selected module descriptors and their associated assessment tasks will be analysed in order to ascertain whether and to what extent critical thinking is made explicit as a learning outcome. We will look at the module descriptors that are linked to each of these modules to examine their learning outcomes, assessment tasks and teaching methods used to achieve those learning outcomes. We will be looking to see first of all if the learning outcomes specifically mention critical thinking or if critically thinking is addressed in a more implicit manner in the learning objectives. We will then go on to look at what the module coordinator uses to try to instil critical thinking in the students. What methods are used that develop critical thinking? Are any innovative approaches used? Do these differ in different disciplines? How dependent are these on how the discipline both defines and rates critical thinking?

We will also be very interested to examine how a particular module checks if students actually have developed critical thinking in the module. How is critical thinking recognised in a student and what methods are being used across the university to try to measure critical thinking in students? With this in mind, we will look at how the development of critical thinking ability may be demonstrated in students' work and to this end we will ask module co-ordinators to nominate 3 pieces of students' work for the purposes of documentary analysis. We will work with de-identified copies of this work and will seek the explicit written consent of the students nominated through the module co-ordinators.

At the same time, we will also conduct interviews with the module coordinators to contextualise our documentary analysis. This interview will focus on how students develop critical thinking abilities and how the module coordinator sees this as being represented in their module.

2.4 Interviews with Employers

The final stage of this project will take place next year. The researchers involved in this study are from a number of diverse backgrounds: Health Sciences, Education and Civil Engineering. It is intended at this point to contact employers in each of these disciplines and to carry out semi-structured interviews looking at how they view critical thinking as a graduate attribute, if it is important, how they define it and if the graduates from Irish universities demonstrate what they see to be critical thinking.

3. ANALYSIS AND CONCLUSIONS

The study is a multi-method qualitative study, involving in-depth, semi-structured interviewing (Fontana & Frey 2003) together with documentary analysis (Prior 2003). Analysis and interpretation will be informed by the work of Silverman (2003) on interview, narrative and content analysis, Prior (2003) on documentary analysis and Attride-Stirling (2001) on thematic network analysis.

It is hoped that this work will inform research into critical thinking in the university curriculum. While critical thinking is often stated to be very important to graduates, the definitions of what critical thinking really is are confused and diverse. Do all disciplines see critical thinking as the same? Our earlier analysis of interviews conducted so far would suggest not, with significant differences between disciplines in a number of areas. Disciplines differ firstly in how they interpret and define critical thinking, with some disciplines having a very clear idea of what critical thinking is and where it comes from. For other disciplines, the issues of critical thinking were felt to be very important but the definitions held by that discipline of critical thinking were not very clear and there was no real single definition agreed by that discipline of critical thinking. Disciplines were also very different about how they felt that critical thinking could be assessed and taught. Some disciplines were keen to build critical thinking into their modules from an early stage, even if they did not call it critical thinking. But they asked students to develop analysis skills, research skills and skills of independent learning very early on and built these into the curriculum. They used diverse assessment techniques (work placement, theses, research projects, group projects) to try to assess if students had developed these skills. Other disciplines saw critical thinking as being less important and not something that needed to be measured.