

## Critical Thinking Interview Transcripts 14/03/2012

What do HE lecturers say about critical thinking in STEM subjects?

A range of lecturers in STEM subjects were asked:

*“Can I beg five minutes (or ten max!) of your time? I am developing some workshop materials for teaching critical thinking – can I ask for your ‘quick and dirty’ answers to the questions:*

- 1) *What is critical thinking (in your discipline)?*
- 2) *What are the main things you want your students (let’s say third year undergrads) to be able to do as critical thinkers?*

*Now, I know that these are not simple questions and that one could write a thesis on each of them – but what I’m after are your ‘first thoughts’ on this.”*

A1

They need to ask questions rather than just taking things at face value. Being a critical thinker means being willing to suspend judgement until you’ve looked at all the evidence available and considered a range of possible explanations before coming to a conclusion

A2

I want students to be able to write literature reviews that incorporate a range of data/views, that have well-constructed arguments and lines of thought. This also applies to their dissertations where they should be able to incorporate their own findings into the existing literature. To have the potential to disagree with what other scientists have written if it does not fit with their results.

B1

Critical thinking – it’s the ability to approach existing hypotheses, theories etc with an open yet questioning mind. To be able to analyse data that you or others have collected to produce scientifically rigorous results and to be able to formulate arguments to support interpretations.

B2

Analyse an issue from differing perspectives

I want them to assess the sustainability of a 'proposed' solution to an environmental issue using environmental, economic and social criteria

Compare and contrast management options for mitigating environmental impacts using a range of criteria

Appraise the body of knowledge relevant to an area of environmental science in an objective and balanced manner

## C1

Getting beyond description by developing and using insight

An objective ability to dissect an issue and interpret (or reflect on) the 'whole picture' rather than just adopting a subjective or naïve viewpoint.

## C2

Interpret their own data in an objective and balanced manner

To have their own justifiable views/positions, rather than being told what to think (a la Daily Mail) without questioning if this is correct. To challenge orthodoxy. To have an appreciation of the limitations of their own knowledge/understanding whilst being able to apply this in a novel context or situation. To be safe practitioners.

## D

Don't accept the first thing you read! Be able to distinguish between popular journalism and academic writing and knowing what sources are likely to be reliable.

## E1

Questioning assumptions, evidence and conclusions in a rational manner. Science is based on empirical results, but that does not necessarily mean that the conclusions drawn are correct or that the results of any given study are reliable or repeatable. Individual studies may be flawed and whole subjects may become bound by dogma - critical thinking is essential in science but while it's usually straightforward when reading a single article, it takes a very good scientist to be able to do this over a subject area and an exceptional one to create a paradigm shift.

## E2

All scientists, from undergraduates to Nobel laureates, need to ask questions. This is not limited to formulating your own hypotheses, but needs to be applied when reading papers. So we're back to where I started - question assumptions, evidence and conclusions in a rational manner. This necessarily requires that they read around the subject, as it would be almost impossible to do this effectively without a reasonable understanding of the literature in the field. Finally, they need to be able to synthesise relevant material and to communicate their synthesis clearly. Fortunately, in Marine Biology we have a reasonable number of students that can actually do this (at least by the time they are submitting their final year projects).