Critical Thinking:
More Questions than Answers?

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Pedrio, Plymouth
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WHY AM I HERE?
CRITICAL THINKING

• A defining concept of the Western University (Barnett, 1997)

• >90% of faculty in USA: CT most important element of university education (Bok, 2006)

• QAA, 2008; national standards and quality frameworks expect it

• State requirements – NC and others

BUT

Industry reports say we are not doing it!
FINDING A SOLUTION TO AN AGE OLD PROBLEM

HOW DO WE PRODUCE GRADUATES WHO ARE ACCOMPLISHED CRITICAL THINKERS?

WHAT DO WE NEED TO KNOW AND DO?

WHAT DOES THIS MEAN FOR CURRICULUM, TEACHING & ASSESSMENT PRACTICES?

WHERE DO WE START?
START BY DEFINING THE PROBLEM:

WHAT IS CRITICAL THINKING AND IS IT AN AGE OLD PROBLEM?
Wilhelm von Humboldt

..‘modern university education founded in Berlin (1800s)

...home to many recognized philosophers & thinkers – Planck, Einstein, Marx, Engels

...foundation for modern university in its ‘union of teaching and research in the work of the individual scholar or scientist’

Research and research-informed teaching-underpinning tenant today & critical thinking is fundamental to this
BUT: routes of Western Philosophy included critical thinking
So what is Critical Thinking?

It is important that students bring a certain ragamuffin, barefoot irreverence to their studies; they are not here to worship what is known, but to QUESTION IT.

— Jacob Bronowski
Some definitions:

..a desire to seek, patience to doubt, fondness to meditate, slowness to assert, readiness to consider, carefulness to dispose and set in order; and hatred for every kind of imposture. Francis Bacon, (1605)

...reasonable, **reflective** thinking that is focused on what to believe or not (Robert Ennis)

...skilful, responsible thinking that is conducive to good judgement because it is sensitive to context, relies on criteria and is **self correcting** (Matthew Lipman)
...the use of those cognitive skills or strategies that increase the probability of a desirable outcome. It is used to describe thinking that is purposeful, reasoned, and goal directed – the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions, when the thinker is using skills that are *thoughtful* and effective for the particular context and type of thinking task. (Halpern, 2003)
...if you want more-

http://www.cyberartsweb.org/cpace/ht/thonglipfei/other_ct_df_n1.html
With all this confusion, is it surprising that our students don’t know how to demonstrate it when we ask them to think critically!

So what are we asking them to do?
Critical Thinking

The art of thinking about your thinking while you are thinking in order to make your thinking better: more clear, more accurate, or more defensible.

“Don’t believe everything you read on the Internet just because there’s a picture with a quote next to it.”
—Abraham Lincoln

Paul, Binker, Adamson, and Martin (1989)
Critica – a 5 year international study

Aim – to create an online resource to support the development of critical thinking

Questionnaire provided two opportunities:

- To understand if and how colleagues teach CT
- To attempt some consensus about skills & attributes for CT
Delphi Study
An exercise in ‘expert’ consensus

Question: ‘What do you consider to be the key skills that students need to develop to carry out a successful critical review/appraisal of artefacts/resources in your discipline?’

Process: Stage 1: Responses analysed and grouped in 4 themes: Knowledge, Discrimination, Managing Information, Skills. Consolidated to 42 statements.

Stage 2: participants asked to rate statements.
### Delphi Study

**Stage 3: Duplicate distractors; forced ranking of triplicates (61-80% consensus)**

<table>
<thead>
<tr>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>The capacity to identify the quality of an argument</td>
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<tr>
<td>Capacity to identify supposition in an argument</td>
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<tr>
<td>Demonstrate the ability to be critical and analytical about oneself and ones work</td>
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<td>The ability to read critically</td>
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<td>An understanding of that knowledge is dependent on the context in which it is created</td>
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<td>Capability for finding solutions to problems</td>
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<td>A capacity to create new knowledge by synthesizing information</td>
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<td>The capacity for dealing with multiple points of view.</td>
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<td>A disposition for intellectual curiosity.</td>
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<td>An ability to construct a reasoned case</td>
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<tr>
<td>To interpret complex data in a creative manner</td>
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<tr>
<td>Developing a reasoned response to the views of another</td>
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</table>
Delphi Study

Stage 4: Forced ranking of top 12 statements

Unfortunately, despite repeated reminders & requests, the response rate was too poor to allow further analysis.

However, it did identify analysis, inference, explanation, evaluation interpretation and self-awareness.
Thematic analysis – grounded approach

Facione & Facione 1990

134 responses providing 394 statements

Analysis of fit to Facione framework (Analysis, Evaluation, Explanation, Inference, Interpretation, Self-awareness)

General skills – Literacy; numeracy; knowledge of subject, team working etc comprised 38 statements
## Thematic analysis – grounded approach

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SUB-CATEGORY</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation (39)</td>
<td>None</td>
<td>They need to evaluate concepts such as scholarly rigour, validity and reliability</td>
</tr>
<tr>
<td>Explanation (41)</td>
<td>Communication (21)</td>
<td>Communicating their findings</td>
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<tr>
<td></td>
<td>Argumentation (13)</td>
<td>Use effective argument to make their case skills to compare and contrast arguments;</td>
</tr>
<tr>
<td></td>
<td>Compare &amp; Contrast (7)</td>
<td></td>
</tr>
<tr>
<td>Interpretation (42)</td>
<td>General (10)</td>
<td>They must be able to understand the information they find</td>
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<tr>
<td></td>
<td>Understanding (22)</td>
<td>Be able to recognise that situations are different and changing.</td>
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<td></td>
<td>Categorising/Contextualising (8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sense making (2)</td>
<td></td>
</tr>
<tr>
<td>Inference (58)</td>
<td>General (15)</td>
<td>Ability to then synthesise these results into novel outcomes such as models or suggestions for future research</td>
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<tr>
<td></td>
<td>Synthesis (14)</td>
<td>Students can then judge whether a particular source grapples with the central questions</td>
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<tr>
<td></td>
<td>Questioning (22)</td>
<td></td>
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<tr>
<td></td>
<td>Judgment (7)</td>
<td></td>
</tr>
<tr>
<td>Analysis (43)</td>
<td>None</td>
<td>Ability to recognize patterns and anomalies Understanding of what graphical or numerical information is illustrating, through this clear outliers can be detected.</td>
</tr>
</tbody>
</table>
# Thematic analysis – grounded approach

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<th>CATEGORY</th>
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<tr>
<td>Information skills</td>
<td>Discriminating information sources (34)</td>
<td>Recognise what it is that they are actually looking at when they use the Web</td>
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<tr>
<td></td>
<td>Organising information (3)</td>
<td></td>
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<tr>
<td></td>
<td>Search skills (13)</td>
<td></td>
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<td></td>
<td>Review skills (4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Knowledge (23) (Subject 17; Research methods 5; General 1)</td>
<td>Information management discovering authoritative sources which can be referenced</td>
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<td></td>
<td>Competence (4)</td>
<td></td>
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<tr>
<td>Self-Regulation</td>
<td>General (1)</td>
<td>Self-reflection and self-awareness</td>
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<td></td>
<td>Reflection (10)</td>
<td>Habits of mind confidence in their thinking and opinions,</td>
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<td></td>
<td>Thinking (18)</td>
<td>An awareness of one’s own emotional response to an issue</td>
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<tr>
<td></td>
<td>Confidence (8)</td>
<td>willingness to seek out alternative views and literature</td>
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<td></td>
<td>Emotional intelligence (4)</td>
<td></td>
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<tr>
<td></td>
<td>Objectivity (10)</td>
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Thematic analysis – grounded approach

Critical Thinking Framework

**Information Skills**
The ability to identify and collate relevant information from a variety of sources, which is reliable, authoritative, and valid; able to support judgements and contribute to new knowledge creation. Ability to discriminate between sources and demonstrate an understanding of how your own biases and / or those of the originator may affect this. Knowing how to ask the right questions to provide further information.
Other skills: questioning; information literacy

**Examination**
To communicate the outcomes of your thinking / reasoning in a logical and understandable way, justifying it in terms of the evidence, theory, and concepts having given consideration to relevant issues and criteria. To present your reasoning in the form of clear, logical, convincing arguments
Other skills: comparing and contrasting reasoning, displaying; illustrating; argumentation and communication skills

**Inference**
To identify the consequences resulting from relevant data, evidence, judgements and opinions and use that knowledge to form ideas and hypotheses.
Other skills: questioning evidence, reasoning, proposing alternatives, drawing conclusions

**Interpretation**
To understand and communicate the meaning or significance of a range of experiences, situations, data, events, judgements, conventions, beliefs, rules, procedures, practices or criteria.
Other skills: description, categorization, clarifying meaning, presentation, performance, reading, writing.

**Analysis**
Detailed examination of the elements of statements arguments, artefacts, substances structures and performances. To understand the relationships between evidence, data, concepts observations, statements and questions intended to infer beliefs, confer judgements, suggest reasons and express opinions.
Other skills: recognition and reconstruction of arguments, examination, surveying, scrutinising, pattern recognition

**Evaluation**
To assess the validity and credibility of statements, accounts or descriptions of an individual perceptions, experience, judgement, belief or opinion. To judge the quality, value and impact of something. To determine the logical strength between relationships, actual or implicit (those implicated by evidence or reasoning).
Other skills: ranking, rating, estimating, appraising

Eales-Reynolds & Clarke (modified from Facione, 1990)
THE PROCESS OF CRITICAL THINKING

(after https://think.dasa.ncsu.edu/the-creative-thinking-process/)

www.lesleyjanereynolds.co.uk
Reflection and metacognition are important elements of critical thinking.
Ennis’ Typology of Critical Thinking instruction (1989)

General approach – CT taught separately

Infusion approach – CT infused in other subject matter

Immersion approach – CT a result of immersion in disciplinary knowledge (research methods)

Combination/ Mixed
Behar-Horenstein & Niu (2011) – 42 studies

52% used immersion approach
Improvement more likely when teaching is explicit
No single method consistently better/ worse
Development dependent upon environment, instructor training & instructor-student interaction


- Largest effect – mixed with CT as independent track within course
- Smallest effect – immersion where CT is a byproduct – further reduced when CT skills are not a course objective
- Larger instructional effects when CT requirements are clear and important part of course design.

- **Most effective** - developing CT skills and applying them to course content *explicitly*.
- **Least effective** - Immersing students in thought provoking subject matter instruction without explicit use of CT principles.
Teaching Critical Thinking (n=141)

- No: 15
- Implicit: 49
- Explicit SA: 16
- Explicit Emb: 19

Underlying Strategies (Ennis, 2011)
“Reflection, Reasons, Alternatives” (RRA):

Encourage students to be **Reflective**; stop and think, instead of making snap judgments, or accepting what is presented in the media.

Encourage students to have good **Reasons** for their views and to seek reasons for others' views. Ask questions “How do you know”, "What are the reasons?" and “Is that a good source of information?”

Emphasize alertness for **Alternative** hypotheses, conclusions, explanations, sources of evidence, points of view, plans, etc.
TEACHING CRITICAL THINKING:

If we can’t articulate what it is:

• How can we teach it?

• How can we design assignments which allow students to demonstrate it?

• How can we recognise it when we are assessing it?
One approach:

Encourage students not to expect ‘Facts’ or a definitive answer.
Perhaps the simplest approach: Develop a questioning approach to everything

Teachers Pet (1958) Paramount Pictures
WHAT ELSE?

- Learning is promoted through the curriculum
- Curriculum design should be framed by learning outcomes (graduate attributes)
- Assessment drives learning – Biggs, Constructive alignment
- Pedagogy follows
- Good feedback – questioning- can encourage the development of good critical thinking skills
WHAT HAVE WE LEARNED?

‘Give the pupils something to do, not something to learn; and the doing is of such a nature as to demand thinking; learning naturally results’. (John Dewey)

Translation: Don’t given them facts to learn, give them authentic problems to solve. In doing so they develop and practice their critical thinking skills, creating new knowledge and learning.
AND FINALLY:

If we teach today’s students as we taught yesterday’s, we rob them of tomorrow.

— John Dewey —

www.azquotes.com
The importance of being Ernest. Oscar Wilde; J Arthur Rank Productions

AND JUST TO SHOW THAT THIS IS AN AGE OLD PROBLEM


