Teaching Critical Thinking to Foundation Year Students
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Richard Harrison,
German University of Technology in Oman,
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TASK 1:

1. Try to solve the puzzle below.

The puzzle

Imagine that four prisoners have been buried up to their necks in desert sand, as in the drawing. Each man can see only what is in front of him, and the wall completely blocks his view of the other side. Their captors place hats on their heads. They are told that there are two hats with black bands and two with white, but none of them is allowed to see the colour of his own, and the brim hides it from view. The buried men are given two minutes, in which time one of them must correctly call out the colour of his own hat-band. If the first one to speak gets it right, inside the time limit, they will all be freed. If not, they will all be left there to die. No communication is allowed, and an incorrect call means they all lose. In short, one of them has to make a life-and-death decision for all of them.

After about one minute, one of the prisoners calls out the colour of his hat-band correctly. He doesn’t guess, and there is no trick to the question. He works it out purely by reasoning.

Activity

So this is your question:
Which one of the prisoners answers, and how does he know he is right?
Answer:
The man who calls out correctly is Sancho.

Reasoning:
• 1. Pepe can only see the wall.
• 2. Pedro can only see the wall.
• 3. Sancho can only see Pedro (black band) and the wall. Therefore, he doesn’t know the colour of his hat band.
• 4. Carlos can see Pedro (black band) and Sancho (white band) but he still doesn’t know what colour his band is.
• 5. After one minute no-one has called out. Sancho argues: “If my hat band was black then Carlos could see two black bands and would call out. He has not called out. Therefore, my hat band must be white!”
Exercises like this:

- train thinking skills
- get students to ‘think about thinking’
• What is critical thinking? How does it differ from ‘everyday thinking’?
• Can ‘critical thinking’ be improved by instruction and practice?
• Why teach critical thinking explicitly? (Isn’t it implicit?)
• How can critical thinking be included in a Foundation Programme?
GU Tech Geoscience professor:

“...the English in these reports is terrible. I can’t understand them!”

“...now the English is better I realise how bad the reports are!”
What does good academic writing require?

• language
• style
• organisation/format

• knowledge
• ‘thinking’
Critical thinking:

• **is a type of thinking** (creative, scientific, ‘every day’, ‘caring’..)

• **is an integral part of academic life** (reading, discussions, research, exams, ...)

• **applies across all disciplines but with different approaches** (e.g. geology: categorising rocks - management: problems and solutions...)

• **encourages scepticism and doubt** (can be considered ‘subversive’)

What is everyday thinking?
What is critical thinking?
Everyday thinking ...

- routine
- non-reflective
- unconsidered
- unconscious
and critical thinking

- conscious
- reflective
- voluntary
- reasonable
- skilled
- ‘thinking about thinking’
Critical thinking - definitions

• “...is a conscious and voluntary effort to establish belief upon a firm basis of reasons.” (Dewey, J.)

• “...is reasonable, reflective thinking that is focused on deciding what to believe or do.” (Ennis, R.)
• “..that mode of thinking – about any subject, content or problem – in which the thinker improves the quality of his or her thinking by skillfully taking charge of the structures inherent in thinking and imposes intellectual standards upon them.” (Paul, Fisher and Nosich)

• “....... an active process that involves both questioning and metacognition (thinking about thinking)...” (Fisher and Scriven)
**Everyday vs. Critical thinking**

( adapted from Fisher, R., 2003)

<table>
<thead>
<tr>
<th>Everyday Thinking</th>
<th>Critical Thinking</th>
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<tbody>
<tr>
<td>Guessing</td>
<td>Estimating</td>
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<tr>
<td>Preferring</td>
<td>Evaluating</td>
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<td>Assuming</td>
<td>Justifying</td>
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<td>Listing</td>
<td>Classifying</td>
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<td>Accepting</td>
<td>Hypothesising</td>
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<td>Judging</td>
<td>Analysing</td>
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<td>Inferring</td>
<td>Reasoning</td>
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Some basic critical thinking skills
From Glaser (1941) and Fisher & Scriven (1997)

- recognise problems
- identify problem solutions
- gather pertinent information
- recognise unstated assumptions
- appraise evidence and evaluate statements
- interpret and evaluate data
- recognise logical relationships
- draw warranted conclusions
- test conclusions
- reconstruct one’s belief’s
- produce and defend arguments
Bloom’s Taxonomy - adapted by Anderson/Krathwohl (2001)
Cognitive Domain: Levels of understanding

- Remember
- Understand
- Apply
- Analyse
- Evaluate
- Create
• How can we raise the students’ level of understanding?
• How can we incorporate critical thinking into the Foundation Year syllabus?
Gutech Foundation Programme

- Academic English
- IT
- Maths
- Creative Design
- Study Skills
- Options – Economics
  Physics/Chemistry
Challenges facing foundation year students (at Gutech)

• take responsibility for their own learning
• tackle new academic subjects
• study in English
• adapt to a new learning and social environment
• Academic English
  – Academic writing
  – Reading
  – Seminars/Discussions
  – Presentations
• Study Skills
  – Explicit teaching of critical thinking
  – Puzzles and brain teasers
  – Finding chains of reasoning
  – Recognising strong/weak arguments
Essay: “Discuss the advantages and disadvantages of skyscrapers.”

• “... they [skyscrapers] could also cause problems. For example, the more you go up the less pressure and oxygen you have and that could lead to health problems. ......”

• “I remember when my uncle’s house was ready, he invited us for lunch and my cousins and I ......went up to the second floor. When we started climbing we were out of breathe as if we had been jogging for hours.”
Woolly thinking
5 activities to teach critical thinking

1. Focus on words and phrases used to structure a line of reasoning
2. Use short texts to analyse chains of reasoning
3. Focus on the use of tentative language
4. Give examples of texts with strong/weak arguments
5. Use frameworks to prepare students for writing tasks
1. Focus on words and phrases used to structure a line of reasoning: i.e. signal words

- initially, firstly, to begin, at the outset ..
- in addition, also, similarly, as well as, furthermore, moreover..
- however, on the other hand, in spite of this, nevertheless, ..... 
- therefore, as a result, thus, consequently, because of this .......
- in conclusion, we can see, ....

These words highlight the line of reasoning.
2. Use texts to analyse chains of reasoning

1. Find the conclusion in these statements.
2. Reorder the sentences. Add the signal word: therefore.

• Bottled water is extremely expensive.
• People should use tap water instead of bottled water.
• Tap water tastes very similar to bottled water.
• Plastic bottles are very bad for the environment.

(adapted from Butterworth and Thwaites)
Bottled water is extremely expensive.
Tap water tastes very similar to bottled water.
Plastic bottles are very bad for the environment.
Therefore, people should use tap water instead of bottle water.

R1 + R2 + R3 → C
These types of exercise:

- draw attention to the logical structure of a text
- indicate the language that is used to signpost the structure
- train students in thinking logically – a ‘mental gym’
• The results *suggest* that *most* people prefer to visit shopping malls instead of purchasing goods on-line. *It would appear* that the *main* reason for this is social and not economic, i.e. *the majority of* customers *seem to* appreciate the lively atmosphere of a busy shopping mall. A further factor *could be* ..........
4. Give examples of texts with strong/weak arguments

**Strong arguments:**
- distinguish between fact and opinion
- draw sound inferences from available evidence
- use well-developed reasoning
- etc

**Weak arguments:**
- make false correlations
- contain false analogies
- use emotive language
- misrepresent others’ opinions
- etc
5. Use frameworks in the planning stage

A framework is a tool to:

- develop critical thinking
- aid academic writing
• “What are the benefits and drawbacks of studying overseas? Is it a good idea for students who would like to go to university? Discuss.”
## INTRODUCTION

### FRAMEWORK A: Advantages/Disadvantages

<table>
<thead>
<tr>
<th>ADVANTAGES</th>
<th>DISADVANTAGES</th>
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<td>2</td>
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## CONCLUSION
# INTRODUCTION

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Reasons</th>
<th>Disadvantages</th>
<th>Reasons</th>
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</thead>
<tbody>
<tr>
<td>1 Saves land</td>
<td>Many people in small area</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>2</td>
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# CONCLUSION
Choose one of these statements:

- Women should not be a part of the armed forces.
- Families in Oman should not employ maids.
- Shopping malls are destroying Omani culture.
- Tourism has a negative effect on Oman and the people.

1. Do you agree or disagree with the statement?
2. What are your reasons? List them below. Add any explanations.
3. Think of the main counter-argument. Why is this wrong?
4. Use the information to write a short opinion essay.
FRAMEWORK B: Opinion

<table>
<thead>
<tr>
<th>REASONS</th>
<th>SUPPORTING STATEMENT/EXAMPLES</th>
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<td>2.</td>
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<td>3.</td>
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<td>4.</td>
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CONCLUSIONS
“Both Chicago and Doha have bid to be host cities for the Olympic games in 2016. Evaluate the bids of the two cities.”
“Oman has one of the highest road accidents rates in the world. How can this rate be reduced? Examine the options and assess their practicality.”
Frameworks can also be used for the following:

- Problem solution
- Cause effect
- Definitions
- Classifications
- Processes
- Procedures
- Analysis of data
- Chronology
- Descriptions
Conclusions

• academic writing is more than appropriate language, style and format

• critical thinking is a skill which can be taught explicitly

• critical thinking skills can be improved by practice

• teaching critical thinking can improve academic writing
References

- [http://www.criticalthinking.org](http://www.criticalthinking.org)
Teaching Critical Thinking through Academic Writing

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