

Access Reading

Study Skills Session, Supporting Documents

Thursday 4th April 2024

Name:

PhD tutor:

Amber

Subject Strand:

Mathematics

Critical thinking:

Critical thinking can be defined as the process of working out **what** you think and **why** you think this.

Critical thinking is essential to all subject disciplines at university study. It is very common for new university students to receive feedback that they need to think thus write more critically to develop their essays and ultimately receive higher grades.

At university critical thinking also involves:

- Identifying **what you want to know**, and **why**.
- Sourcing **relevant and reliable** information.
- Grounding your thinking in this **evidence**.
- Addressing **contradictions** in wider academic thinking.

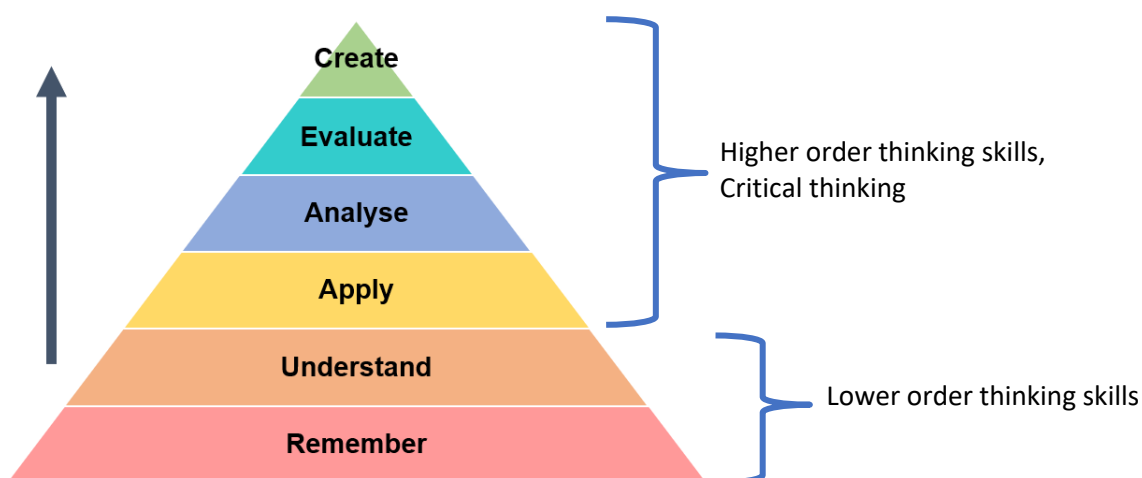
Critical thinking is an important study skill that you will develop at university, practising this skill before enrolling at university to help you make a smoother transition academically.

Bloom's Taxonomy:

To help establish how critical we are being we can utilise Bloom's Taxonomy. Through Bloom's Taxonomy we can see the stages of learning as a hierarchy of critical analysis.

"Remember" requires the least amount of critical thinking and "Create" requires the most. The higher your university work sits on the pyramid the more critical you are being. This means when you analyse and evaluate academic literature you are seen to be more critical than those which simply describe theories and claims without questioning their validity.

To achieve a higher level on the pyramid you still need to undertake everything beneath it but be sure not to get trapped there!



Stages	Description	Examples of words associated with this level
Create	Produce new or original work.	Design, construct, develop, formulate, investigate
Evaluate	Justify a stand or decision.	Argue, defend, support, critique, weigh
Analyse	Connect and question concepts.	Relate, compare, contrast, examine, question
Apply	Use information in new situations (e.g., exercises).	Execute, implement, solve, use, demonstrate
Understand	Explain in your own words.	Describe, discuss, classify, recognise, paraphrase
Remember	Recall concepts from lectures.	Define, state, memorise, repeat, quoting

In pairs, discuss and decide whether the following actions show higher or lower-order thinking and where each of them fits into Bloom's hierarchy of criticality.

Action	Higher or lower-order thinking	Level of criticality
Explain a theory.		
Judge the quality of an interpretation of evidence.		
Test a theory using primary research you have collected.		
Quote a secondary source.		
Trace links between sources in a discourse.		
Determine whether enough evidence has been collected or presented in a piece of literature.		
Make recommendations.		
Interpret evidence in a way that is informed by a particular theory.		
Paraphrase a source.		
Acknowledge a key authority on the topic		

My thoughts...

Relevant take aways from the information presented...

Things I know already about this topic based on
previous experience ...

Things I need to know more about...
What questions come up?

Critical reading notes:

Remember you don't have to answer all the questions, use them in a way you find useful.

<p>What are the key arguments in the text?</p>	
<p>What were the strengths of the argument presented? What was convincing and why?</p>	
<p>What were the weaknesses of the argument? Are there any flaws, gaps or limitations to the argument?</p>	
<p>How can I use this source to answer the essay question? What can be learnt from this article?</p>	
<p>How does this text relate to other information I have read and/or my personal experience? Does it agree, contradict, or challenge my current knowledge?</p>	
<p>Does the author reference other's work which I would be interested/should look at myself?</p>	

Further resources:

How to read an academic paper

- For a general explanation of the structure of an academic paper and how to approach reading it:
<http://www.owl.net.rice.edu/~cainproj/courses/HowToReadSciArticle.pdf>
- There is also a method called the 'Three-pass approach'. The key takeaway is to not read from start to end, but focus on the sections that are relevant to you and the question you are trying to answer.
<http://ccr.sigcomm.org/online/files/p83-keshavA.pdf>

Computing resources

- An important online forum where you will find many of your coding questions answered: <https://stackoverflow.com/>
→ Often, a Google search of an error/question will lead you to a specific page on StackOverflow. Make sure that this page discusses the particular problem that you are having, it is easy to get into a rabbit hole that doesn't quite solve your problem but instead confuses you more!
- Online calculators:
<https://www.desmos.com/scientific>
<https://www.wolframalpha.com/>
- For coding, I recommend working with Visual Studio Code
<https://code.visualstudio.com/>
<https://code.visualstudio.com/docs/introvideos/basics>
Many possible extensions, e.g. integration with GitHub, LaTeX, GitHub Copilot, etc.
- For report writing, when there are any equations involved, I recommend LaTeX, which allows for nice automated formatting. It takes a bit of time getting used to how it works, but you will love it afterwards.
An online resource for LaTeX that can be used without downloading any programme on your own laptop, is
<https://www.overleaf.com/>

Interesting and useful mathematics YouTube channels

- 3Blue1Brown
- Numberphile
 - o We discussed the Josephus' Problem in the session. They also have a video on it: <https://www.youtube.com/watch?v=uCsD3ZGzMgE>

Artificial intelligence

- Artificial intelligence can be used as a tool to support your learning. However, **never** use it to replace your work; teachers will be able to tell! Moreover, you are at university to learn yourself, and this can only happen when you do the work yourself. That said, for support I would recommend
 - o <https://www.perplexity.ai/>
It has up-to-date information and tries to get achieve more truthful answers as compared to ChatGPT.

- <https://typeset.io/>
SciSpace allows you to get an initial overview of an academic paper and to ask academic questions.
- There are methods to write better prompts that an AI can understand and answer better:
<https://www.linkedin.com/pulse/llm-prompt-engineering-patterns-stephen-redmond/>
For those interested in this: <https://arxiv.org/abs/2201.11903>
- Never assume that AI says the truth. It is based on information on the internet, which has a lot of bad, false information.

General knowledge podcasts

- '50 things that made the modern economy' by the BBC.
<https://www.bbc.co.uk/programmes/p04b1g3c/episodes/player>
- '30 animals that made us smarter' by the BBC.
<https://www.bbc.co.uk/programmes/w13xttw7/episodes/player>
→ The episode on 'Termite and ventilation system' might be of interest to Architectural Engineering students.
<https://www.bbc.co.uk/programmes/p079knj8>

Problem solving resources

- This Wikipedia page describes a useful problem solving method, based on a book that has been widely used since 1945
https://en.wikipedia.org/wiki/How_to_Solve_It
- A leaflet from the University of Cambridge to help first-year undergraduate students approach difficult problems! The tips they give are generally helpful, and it is pretty easy to read/skim.
<https://www.maths.cam.ac.uk/undergrad/files/studyskills.pdf>
- For the Computer Science students – Alan Turing's 100th birthday is nice to have a look at:
<https://doodles.google/doodle/alan-turings-100th-birthday/>
- Another exercise you can have a look at: <https://mathspp.com/blog/problems/circle-of-hats>
- 'The Oldest Unsolved Problem in Math' - Veritasium
<https://www.youtube.com/watch?v=Zrv1EDlqHkY>
- The internet has many more interesting mathematics/logic problems!

Mathematics revision materials

- If you have a chance over the summer, I highly recommend looking through these mathematics revision materials. It is easy to underestimate how quickly one forgets things even when you just had a big exam on them! You will need mathematics from the start of your studies, so it really helps to be prepared.
- Materials from Bristol University:
<https://www.bristol.ac.uk/media-library/sites/physics/documents/new-students/Maths%20Revision.pdf>

- Materials from Newcastle University:
<https://www.staff.ncl.ac.uk/johnappleby/files/2022/09/Maths-revision-booklet-Aug-2020.pdf>

Other:

Meditation

- I would recommend seeing if meditation is for you. It helps me deal with pressure and stress, and live a balanced life. I personally use the app 'Medito'.

Imposter syndrome

- Imposter syndrome might come up at some point in your university career. Though it may be difficult to believe, there are many people that feel similarly, and there are many resources to help out there. Here are some suggestions:
<https://www.youtube.com/watch?v=ZQUxL4Jm1Lo>
<https://www.ucl.ac.uk/students/news/2021/sep/3-tips-manage-imposter-syndrome>
<https://warwick.ac.uk/services/wss/topics/impostorsyndrome/>
<https://www.youtube.com/watch?v=eqhUHvVpAwE>
<https://margarecollins.com/resources/>

Blog about procrastination

- All of us have procrastinate! I certainly do. I was only recommended this in my third year of my Undergraduate studies, and wish I had found it sooner.
<https://waitbutwhy.com/2013/10/why-procrastinators-procrastinate.html>

Time management skills

- There are many apps that let you manage your time. Google can give you suggestions, see which one might fit you!
- Furthermore, in the link below there are some useful points. Personally, I would focus on (1) the SMART goals and (2) prioritisation by labelling tasks as important/not important and urgent/not urgent.
<https://libguides.cam.ac.uk/maths/studyskills>

University/Students' Union support services

- Some links to help you find and access the support services available:
- At the University of Reading
<https://www.reading.ac.uk/ready-to-study/study/support>
- At the Students' Union
<https://readingsu.co.uk/advice-&-support>

If you have any further questions please email:

accessreading@reading.ac.uk