

## **Using AI For Research**

#### Is Artificial intelligence useful for research?

Artificial Intelligence can be used for a huge variety of things and helping with research is one of the things it does best. There are a huge variety of tools online that can be used; in this stream we will be using Gemini, Claude, Microsoft Copilot, and ChatGPT. These are all generative AI tools; they can be used as virtual assistants and help with a variety of activities. Each tool generates information in a different way (just like four different people would).





#### Section 1 - Gemini, Claude, Copilot, and ChatGPT

Getting setup; these are the links to the four generative AI tools we'll look at:

1. <u>Gemini</u>

2. <u>Claude (you have to be over 18 to open Claude)</u>

- 3. <u>Microsoft Copilot</u>
- 4. ChatGPT

To start with, open up Gemini, Claude, and ChatGPT on separate tabs.

On the NAIS laptops, you can use the 'favourites bar' in the Chrome browser to open the tabs. You should be able to use each of them with the pre-populated NAIS login and password.



## **Simple Explanations**

#### **1. Simple Explanations**

For all four, signing in will take you to the prompt screen – a screen with a bar on the bottom in which you can enter a question. An important use for AI in schoolwork is to help you understand complex topics. For this, ask each AI model to explain a scientific concept to you – for example, you could enter the prompt **"What is photosynthesis?"** 

**Straight** away you'll notice that each AI tool has a slightly different answer. Even if you asked the same AI tool the same question again in a different chat, it would come up with a different response. However, the answers that each give should boil down to the same points - giving you an explanation of photosynthesis.

#### Gemini:



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Photosynthesis is an amazing process by which plants, algae, and some other organisms turn sunlight, water, and carbon dioxide into food (in the form of sugar) and oxygen. It's essentially the foundation of life on Earth as we know it! Here's a breakdown:

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#### Claude:



Photosynthesis is the process by which plants, algae, and certain bacteria convert sunlight into chemical energy that can be later released to fuel the organisms' activities. The key components of photosynthesis are:

#### **Microsoft Copilot:**



what is photosynthesis

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Copilot

Photosynthesis is the remarkable process by which green plants and certain other organisms transform light energy into chemical energy. Let's delve into the details:

#### **ChatGPT:**

#### ) You

What is photosynthesis



#### ChatGPT

Photosynthesis is a process used by plants, algae, and some bacteria to convert light energy, usually from the sun, into chemical energy stored in glucose (a type of sugar). This process is fundamental to life on Earth, as it is the primary source of organic matter for the food chain and also releases oxygen into the atmosphere, which is essential for aerobic respiration in most living organisms.

It is important to realise that **the answers that each AI tool gives may not necessarily be totally correct** – they are language models that generate responses based on patterns that they find in their research data. However, both Gemini and Bing Copilot have tools that help identify mistakes and correct them.

With Gemini, clicking on the <u>G</u> icon on the bottom of the response will double check the response based on information that it finds on the internet. Bing Copilot provides sources for the information it gives at the bottom of the response, and <u>clicking on an underlined sentence will take you to the source of that information</u>. This makes both Gemini and Bing Copilot a lot more effective for research.



## **Improving Your Prompts**

#### **2.** Improving Your Prompts

To really make sure that you get the response that you want, it is important to make sure that your prompt is as detailed as possible. As a follow up from the previous prompt, you could enter something like the following **"Can you explain the most important steps of photosynthesis, and how the process helps plants grow"** 

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Can you explain the most important steps of photosynthesis, and how the process helps plants grow?





Certainly! Here's a breakdown of the most important steps of photosynthesis and how they contribute to plant growth:



Can you explain the most important steps of photosynthesis, and how the process helps plants grow?

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Sure, here is an explanation of the key steps of photosynthesis and how it helps plants grow:

#### 💄 You

Can you explain the most important steps of photosynthesis, and how the process helps plants grow?

#### 쳙 Copilot

Certainly! Photosynthesis is a vital process for plants, allowing them to create their own food and grow. Let's break it down:

#### You

Can you explain the most important steps of photosynthesis, and how the process helps plants grow?



#### ChatGPT

Certainly! Photosynthesis consists of several key steps, divided into two main phases: the light-dependent reactions and the light-independent reactions (Calvin cycle). Here's an outline of these phases and how they contribute to plant growth:

Compare this response to the previous response you got from the previous question. You should notice that the response is more in-depth and focused on certain parts of photosynthesis that relate to the question.

You can take this further by asking each model to simplify (or clarify further) their response. For example, ask each model "Can you explain the most important steps of photosynthesis, and how the process helps plants grow? Explain like you are talking to a 14-year-old child."



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Can you explain the most important steps of photosynthesis, and how the process helps plants grow? Explain like you are talking to a 14 year old child

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Imagine you're a plant chef, whipping up delicious food using sunlight as your oven! Here's how it works:

Can you explain the most important steps of photosynthesis, and how the process helps plants grow? Explain like you are talking to a 14 year old child

Sure, let me try to explain photosynthesis in simple terms that a 14-year-old can understand:

Photosynthesis is like a plant's way of making food, kind of like how humans can make a sandwich or cook dinner. It's how plants "eat." Here are the main steps:



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As you can see, the more detailed the prompt, and the more limits you put on the model you are talking to, the more refined the response is. In order to get the right response, it is sometimes necessary to modify your prompt a number of times.

# You Can you explain the most important steps of photosynthesis, and how the process helps plants grow? Explain like you are talking to a 14 year old child Copilot Sure! Let's break down photosynthesis in a way that even a 14-year-old can understand. Imagine plants as little factories that make their own food. Here's how they do it:



#### ChatGPT

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Sure! Let's break down photosynthesis into simpler parts and see how it helps plants

grow, kind of like a superhero power that plants have!

## **Limitations for Research**

#### 3. Limitations for Research

There is a noticeable difference in how these models respond to questions relating to very recent events. Try asking each model what the current official cash rate is – **"What is the current official cash rate in New Zealand?"** 

Depending on what version of ChatGPT you are using you may notice that it refuses to give an answer. For example, ChatGPT-4 will give an accurate answer but this version is only accessible through a paid subscription. ChatGPT-3.5 (which is available for free) is trained on data that only goes up until **January 2022** so it cannot give any more recent information than that.

Gemini and Bing Copilot along with ChatGPT-4 are connected to the internet and give a more accurate answer. Claude however, can sometimes provide an interesting answer.

Claude only has knowledge up until 2023 – but provides a response for what the OCR is in February 2024. Not only is this information wrong, made up completely by the AI, but Claude also writes that the OCR is reviewed 8 times a year – it is only reviewed 7 times a year. This highlights how common it is for all AI engines (not just Claude) to make up information that seems plausible. However, it is important to note that this does not make Claude a bad AI tool – just that it is better suited to tasks that don't rely on recent developments. Gemini and Bing Copilot are more suited to these tasks, as they are connected to the internet.





These tools can also be used to find outside sources on certain topics. For example, enter the prompt **"Can you give me 5** sources on the Battle of Crete in World War Two? At least three of these sources need to be accessible online." The more detailed the prompt, the better the response will be – you could ask for sources on a specific action in the Battle of Crete to refine the results further.

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#### You

Can you give me 5 sources on the Battle of Crete in World War Two? At least three of these sources need to be accessible online.



#### ChatGPT

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Certainly! Here are five sources on the Battle of Crete in World War II, including three accessible online:

- 1. Book: "Crete: The Battle and the Resistance" by Antony Beevor
  - This book provides a comprehensive account of the Battle of Crete, covering both the military tactics and the civilian resistance during the German occupation of the island.

Again, you will find that as the free version of ChatGPT does not have access to the internet, or information from after January 2022, it does not provide links to the sources it provides or the most recent sources. Some of the sources it provides are accurate – others have different titles or authors than what ChatGPT says. As shown below, the first book that it provided me was accurate, but some of the others, like the book by Heinz Freiser, are not available online.



- Academic Journal Article: "The German Airborne Assault on Crete, May 1941" by Karl-Heinz Freiser
  - This scholarly article delves into the German airborne assault on Crete in May 1941, analyzing the planning, execution, and consequences of the operation.
  - Note: Access to academic journals may vary depending on your institution's library subscriptions.

Claude, also without access to the internet suffers from a similar problem. Although it provided links to websites, none of these links worked at the time of writing, but articles on those websites about the battle of Crete existed. Books that it provided had a different title/author than what was listed.



Here are 5 sources on the Battle of Crete in World War Two, with 3 that are accessible online:

Online Sources:

- 1. Commonwealth War Commission Crete: <u>https://www.cwgc.org/the-second-world-war/articles/crete</u>
- 2. The National WWII Museum Crete: <u>https://www.nationalww2museum.org/war/articles/battle-crete</u>
- 3. The Imperial War Museums The Battle of Crete: https://www.iwm.org.uk/history/the-battle-of-crete

Print Sources:

- 1. Beevor, Antony. Crete: The Battle and the Resistance. John Murray Publishers, 1991
- 2. Stewart, A. Battle for Crete. London: Ian Allan, 2016. Print.

However, AI is constantly evolving, and by the time you try this tutorial it may have improved in this regard.

Gemini and Bing Copilot both provide better results – all of the websites that Gemini provided existed, although one of the books that it provided had a slightly different title.

With Microsoft Copilot all of the websites provided exist, and links were given to each of these. However, one of the titles of the books it provided was slightly off, as with Gemini.



## **Uses for Each Model**

#### **Uses for Each Model**

There is no one "best" model for all situations. The model that you should use depends on what kind of question you are asking it.

ChatGPT is great at tasks that use creativity. GPT4 (the paid version) is even better and also has access to the internet which makes it very good at other tasks as well.

An example of a question you could use for ChatGPT is creating an outline for an essay by entering a prompt such as;

"I am creating a persuasive essay on why phones should be banned in school. Three of my key points are that phones can be a distraction, that banning them prevents classroom disruption, and it can reduce bullying. Create a plan that outlines the structure of the essay"

You can see that ChatGPT often produces a better result than other tools with more detailed points. Again, the more detailed the prompt the better the outcome is likely to be.



IV. Reduction of Bullying

A. Explanation of cyberbullying: Define what cyberbullying is and how smartphones facilitate this form of harassment.

B. Statistics on bullying: Present data on the prevalence of cyberbullying among students and its harmful effects on victims.

C. Argument for banning phones: Discuss how restricting phone use in school can limit opportunities for cyberbullying and promote a safer school environment.

V. Counterargument and Rebuttal

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A. Acknowledge opposing views: Address potential counterarguments against banning phones in schools, such as the need for communication or emergency situations.

B. Rebuttal: Refute counterarguments by providing alternative solutions or emphasizing the greater benefits of a phone-free learning environment.

#### VI. Conclusion

A. Restate thesis: Recap your position on why phones should be banned in schools. B. Summary of key points: Summarize the main arguments presented in the essay, emphasizing the negative impacts of phones on student focus, classroom disruption, and bullying.

C. Call to action: End with a compelling call to action, urging readers to support policies that restrict phone use in educational settings for the betterment of students' learning experiences and well-being.





### Asking the models to review documents

#### 4. Asking the models to review documents

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Claude is incredibly useful due to its ability to "read" text files. By attaching a file through the button on the prompt box you can ask Claude questions about the file, either asking it to summarise the content, asking it about specific points, or explaining the content in an easier to understand way.

You can test this out by putting in any PDF file on your computer, or one downloaded from the internet. This is a great tool for research.





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#### 5. Using Gemini to Interpret Images

Finally, Gemini has another great feature in that it can "read" images in the same way that Claude reads text files. By attaching an image with the button next to the prompt box you can ask it to explain the image, specific parts of it, or give you further details not available in the picture image.

This works best with diagrams or graphs, which you can ask Gemini to explain.

Again, you can test this by downloading an image from the internet or using one already on your computer.





## Conclusion

#### 6. Conclusion

Through this tutorial, hopefully you have realised that all of these AI tools have different strengths and weaknesses, especially in a school setting. **Claude is great for explaining word documents**, and any questions related to these, whereas **ChatGPT is better in a more creative context**, where a prompt does not necessarily have a "right" answer. **Gemini and Bing Copilot both are great for use in research**, due to their access to the internet, with Bing Copilot in particular being great for giving sources for its information. These models are constantly evolving, and in time, their ability may increase further.

See the list below for a few more prompts which you can use for these tools. With each prompt you use, think about what tool would work best based on what you have seen each tool do. Remember to adjust these prompts and add more detail if they don't work the way you want the first time. Experiment with changing the prompt to be narrower in its response or more inclusive of a topic it didn't provide much info for.



- 1. How does \_\_\_\_\_\_ apply in real-life situations
- 2. Discuss the causes and effects of \_\_\_\_\_
- 3. Explain the impact of \_\_\_\_\_ on \_\_\_\_\_
- 4. Discuss the major themes in William Shakespeare's Romeo and Juliet
- 5. Analyse the symbolism in Nathaniel Hawthorne's The Scarlet Letter
- 6. Can you help me compare and contrast the Roman Republic and the Roman Empire
- 7. Help me find credible sources for my essay
- 8. Help me understand the basics of \_\_\_\_\_ for my class
- 9. Help me analyse a study on \_\_\_\_\_

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- 10. Write a test covering \_\_\_\_\_\_. It should test students on \_\_\_\_\_\_
- 11. Create a list of 10 educational YouTube channels that cover \_\_\_\_\_ for self-paced learning
- 12. Create a set of flashcards to help me learn
- 13. Suggest 10 chrome extensions to help me improve productivity when studying
- 14. Suggest a schedule for my studying between today and \_\_\_\_\_. The subjects I am studying for are



15. Generate a list of potential essay topics for \_\_\_\_\_, with a focus on \_\_\_\_\_

16. Summarise and format the notes that I have taken into an easy to read way.\_\_\_

17. What are the potential solutions to \_\_\_\_\_ based on \_\_\_\_\_

18. Predict the potential outcomes of \_\_\_\_\_

19. Summarise the key findings of \_\_\_\_\_

- 20. Propose an effective policy to address \_\_\_\_\_
- 21. Explain how \_\_\_\_\_ influences \_\_\_\_\_
- 22. Debunk common myths about \_\_\_\_\_
- 23. Predict future trends in \_\_\_\_\_
- 24. Identify the relationship between \_\_\_\_\_

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25. Explore the latest innovation in the \_\_\_\_\_ industry





## More Tools

#### Section 2 - More Tools

#### Explain Like I'm Five

Explain Like I'm Five does not need much explanation as it is very similar to the previous AI tools. The main benefit of this tool is that it is easy to use and does not require as much effort making sure that the prompt is correct to get a good explanation. However it is only useful in explaining concepts rather than the range of uses that the previous AI models had.

On the main page, there should be a prompt box in the centre, with a toggle for sarcasm on the left-hand side. The most useful tool is below the prompt box, a tool that you can use to change how high-level the response is.



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#### The home page of Explain Like I'm Five:

To start off, use a prompt such as "How do black holes work?"

The AI should come back with a full explanation of the workings of black holes, including how they are formed.

Black holes are like a giant vacuum cleaner in space that sucks up everything that gets too close to them. Imagine a ball that is so heavy that it makes a hole in a trampoline, and if you throw another ball near it, it gets sucked into the hole. That's what happens with black holes, but instead of a trampoline, it's space, and instead of balls, it's stars, planets, and even light!A black hole is formed when a massive star dies and its core collapses under its own gravity. This creates a very dense and small object called a singularity, which has a gravitational pull so strong that nothing can escape it, not even light. The point of no return is called the event horizon, and anything that crosses it is forever trapped in the black hole.

One verifiable fact is that the closest black hole to Earth is about 1,000 light-years away in the constellation Telescopium. It's called V616 Monocerotis or A0620-00, and it's estimated to be about 10 times the mass of the Sun.

Black holes are fascinating objects in space, but they also pose a danger to anything that gets too close to them. That's why astronomers study them from a safe distance using telescopes and other instruments.

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By adjusting the complexity of the response to "dumb", and asking Explain Like I'm Five the prompt again, you will get a slightly more in-depth answer. Black holes are incredibly fascinating and unique objects in space. They are formed from the remnants of massive stars that have undergone a gravitational collapse, resulting in an extremely dense and compact region. To grasp how black holes work, it's important to understand two key concepts: gravity and the event horizon.Gravity is a force that pulls objects together. You experience gravity on Earth when you drop something and it falls toward the ground. The more massive an object is, the stronger its gravitational pull. For example, the Earth's gravity is strong enough to keep us grounded, but the Moon's gravity is weaker, allowing astronauts to jump higher on its surface.

Now, imagine a star much more massive than our Sun. When such a star runs out of fuel and exhausts its nuclear reactions, it can no longer support itself against its own gravity. The star collapses under its own weight, becoming a black hole. The gravitational pull of a black hole is so strong that nothing, not even light, can escape its grasp within a certain boundary called the event horizon.

Another prompt you can use is "What was the most important cause of the New Zealand Wars?".

This provides a simplified answer of how the New Zealand wars were caused. However, as with many historical subjects there is debate as to what the main cause was for the New Zealand Wars. Some historians believe that the government's desire to impose sovereignty over Māori was as important. The answer shown below is what 'Explain Like I'm Five' came up with, and does not mention other causes. It is important to exercise caution when using AI tools such as this, and make sure there is not information omitted.



The most important cause of the New Zealand Wars was the conflict over land between the indigenous Māori people and the British colonial settlers. The British wanted to acquire Māori land for their own settlement and economic development, leading to tensions and ultimately armed conflicts. To understand this, imagine two groups of people with different cultural backgrounds, languages, and ways of life living in the same area. One group, the British settlers, wanted to expand their settlement and economic opportunities, which required land. The other group, the Māori people, had inhabited and owned the land for generations, and their way of life was deeply connected to it.

As an example, in the 1860s, the Taranaki region in New Zealand became a major battleground due to land disputes. The British settlers wanted to establish a township there, but the land was already occupied by Māori tribes who had ancestral rights to it. The tension escalated, leading to armed conflicts and the displacement of Māori communities.

A verifiable fact related to this topic is that the New Zealand Wars lasted for almost three decades, from the early 1840s to the mid-1870s. These conflicts involved both military actions and negotiations between the British Crown and various Māori tribes across different regions of New Zealand.

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**Explain Like I'm Five** can be a useful tool for getting simplified explanations, especially for topics that are well known. However, it can still provide wrong information (as with all AI, and it is important to recognise this. Finally, Explain Like I'm Five currently only allows three prompts a day with the free version.

#### Perplexity

Perplexity, Although available in a similar format to the previous AI models shown, can also be used as a Chrome (or other search engine) add on. You can add it to chrome with the button in the top right corner. It can be removed at any time through this same button.

Once added to chrome, it should appear to the right of the search bar at the top, with its own logo. If not, click the puzzle piece symbol in the same area, and click the pin by Perplexity to pin it next to the search bar. At any point when you are using chrome, you can access perplexity through the logo next to the search bar. Click on the puzzle piece if Perplexity does not appear on the bar

#### Perplexity's Chrome Extension

Perplexity - Al Companion		Add to Chrome
Ø www.per	rplexity.ai 😰 Featured 4.5 ★ (181 ratings)	
Extension	Workflow & Planning 200,000 users	



Now, open up an article such as <u>this one from The Guardian</u> about "the yips"



Once on the article, open up Perplexity. You should see a search bar in which you can enter prompts, with a button labelled focus beneath it. Before we get to that, one of the **most useful tools on Perplexity is the "Summarize" button** in the top right. By clicking this, you will get a summary of the article. Although it doesn't always work perfectly, it will provide a very good summary the vast majority of the time.

At the bottom of the search bar, you will see an option to change the "Focus" of the search. Through this tool you can either allow Perplexity to search just the page, the domain (website), or the whole internet. It automatically is set on searching the whole internet, so for the following questions about the article itself you will have to change it to search the page only.

The second half of the article talks about Joaquin Farias. You can enter into the prompt box questions such as **"Who is Joaquin Farias?"** and **"Where did Joaquin Farias study?"**.

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## ☆ perplexity Summarize summarize This Page ∨

#### Answer

The provided text is an article titled "When I tried to play, my hand spasmed and shook: why musicians get the yips," published in The Guardian. The article discusses the author's personal experience with musician's focal dystonia, a condition that affects specific muscle groups and is related to repeating a physical action, such as playing a musical instrument. The author describes the symptoms, the challenges of diagnosis, and the limited treatment options available, including the use of botulinum toxin (Botox) injections. The article also highlights the work of Joaquín Farias, a specialist in dystonia treatment, and his approach to helping patients cope with the condition through movement

## Both should give you answers taken only from that article.

∰ perplexity	Summarize @ +		
Who is Joaquin Farias			
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Answer			
Joaquin Farias is the director of the Neuroplastic Training Institute in Toronto and adjunct faculty at the University of Toronto. He has a doctorate in biomechanics and a master's in neuropsychological rehabilitation, and has been observing and analyzing patients with dystonia for 25 years. He has written two books on the subject and has developed a web-based dystonia recovery platform that offers a variety of mostly movement activities meant to help a body rebalance a frayed nervous system.			

This works even with people or concepts mentioned only in passing by the article. Eckart Altenmuller is only mentioned near the bottom of the article, with some information about him in the next two sentences but a question about him works equally well, which you can try.

## Who is Eckart <u>Altenmuller</u>

#### 🖸 Answer

Eckart Altenmüller is a neurologist who has spent the last 30 years studying the effects of music on the brain. He is currently working at the University of Music, Drama and Media in Hanover, Germany, where he divides his time among patient care, brain research, and running the university's institute of music physiology and medicine. Altenmüller has shifted his focus from trying to rid the world of dystonia to managing its effects with brain retraining.

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As with many of the previous AI models, you can ask it to explain concepts in a simpler way. If you ask the question **"What is taskspecific focal dystonia?"**, searching across the page only, it will give you an answer directly from the text.

If you change the search to **"Explain task-specific focal dystonia like I am five years old?"**, Perplexity should change the answer into an easier to understand paragraph. You will probably notice that this feature is not as refined as some of the other AI tools such as ChatGPT but still works well enough to be useful.

Of course, if there is no information about a concept in the article then asking a question about it and searching through only the article will not work.



#### 🖸 Answer

Task-specific focal dystonia is a condition that can affect people who perform the same physical action over and over again, like musicians playing an instrument. It makes their muscles do things they don't want them to do, like shaking or cramping, especially when they are doing that specific action. It can make them feel tired, nervous, or angry, and can even cause other problems like trouble sleeping or feeling dizzy. Doctors are still trying to understand it, and they use different methods to help people with this condition, like special exercises and sometimes even injections. It's a bit like when your toy car This article briefly mentions the Covid-19 lockdowns near the top, but does not explain them at all. Now, ask Perplexity **"What were the Covid-19 Lockdowns?"** in a search across only this article. Although they are mentioned in the article, you should find that Perplexity cannot give you an answer for this question, as the search is only limited to the article, and the article does not explain Covid 19 lockdowns. However, if you change the search to across the entire internet, Perplexity will then give you a proper answer.

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The **web search** can be used to answer any question, regardless of how relevant it is to the page you are on. However, as with all AI tools, care needs to be taken when reading the results, as they are not necessarily always true.

The **domain search** can be useful in this regard, as if you know a website is likely to be trustworthy, allowing Perplexity to only search that domain can make sure the results are more likely to be accurate.

## Other tools

#### **Section 3: Other tools**

Through this tutorial hopefully you have learned a bit more on how to utilise AI for schoolwork and research. Below are some more tools which you can use.

- Wolfram Alpha help with maths questions, as well as other subjects
- ChatDox ask questions about text files, articles, youtube videos, audio and video clips
- YouTube Summarised summarises YouTube videos
- Grammarly corrects grammar, can help with writing a variety of content
- Quill Bot similar to Grammarly

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- Otter AI records and summarises video calls
- Tutor AI teaches and explains almost any concept, although works best with well-known things
- Dall-E/Bing image generation generates images based on the prompts you enter.
- Wisdolia generates flashcards from articles, PDFs, and YouTube videos