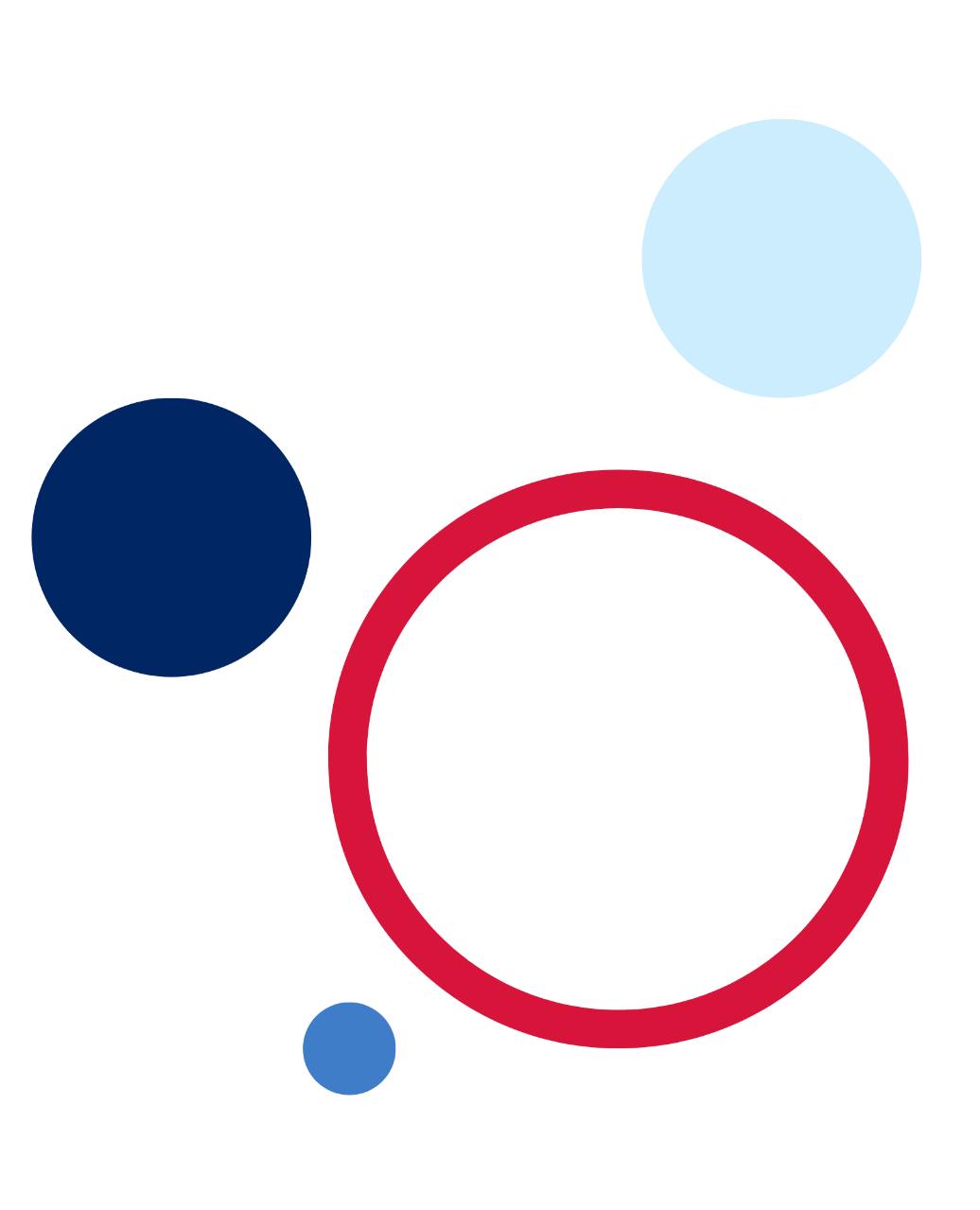
**Investigating Science Stage 6 – Module 7: Conflicts of interest – focus on writing**



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## Overview

**Stage and Learning Area**: Investigating science Stage 6

**Description**: this resource has been designed to address the Module 7 inquiry question:

How does the reporting of science influence the general public’s understanding of the subject? Students analyse how conflicts of interest can result in scientific evidence being suppressed, misinterpreted, or misrepresented and discuss measures to counteract such conflicts, including but not limited to:

* tobacco industry and lung cancer
* fossil fuel industry and climate change
* asbestos mining and lung cancer
* commercial industries researching products for market.

This learning sequence builds an understanding of the writing process for an analytical exposition by investigating conflicts of interest in science. Skills addressed will include: question deconstruction, evaluation of secondary sources, structure and construction of an analytical exposition and peer review of written text.

**Duration**: while timing will vary based on the mode of delivery, differentiation strategies employed and class or school context, this series of activities should take approximately four 50-minute periods.

## Information for teachers

It is suggested that the [learning activity map](#_Learning_activity_map) be provided to students at the beginning of this lesson sequence.

**Note:** ‘Controversial issues may be questions, subjects, topics or problems which create a difference of opinion, causing contention and debate within the school or the community.’ [Controversial Issues in Schools implementation procedures](https://education.nsw.gov.au/content/dam/main-education/policy-library/public/implementation-documents/controversial-procedures.pdf) (2017). Some topics in this learning sequence could be considered controversial and must be treated as such. Ensure you are familiar with the DoE [Controversial Issues in Schools policy](https://education.nsw.gov.au/policy-library/policies/pd-2002-0045) and know your students and community before implementing this lesson sequence.

### Introduction

This learning sequence is designed to build skills in deconstructing a question, evaluating data and writing an analytical exposition gradually throughout the task. Teachers may wish to modify the task or focus on specific sections based on their class context, student ability and current mastery of content.

This content also links with inquiry questions from the other modules, including:

* Module 5: How is the integrity of a scientific investigation judged?
* Module 8: How do economic, social and political influences affect scientific research?

### Outcomes

* **INS11/12-5** analyses and evaluates primary and secondary data and information
* **INS11/12-7** communicates scientific understanding using suitable language and terminology for a specific audience or purpose
* **INS12-14** uses evidence-based analysis in a scientific investigation to support or refute a hypothesis

[Investigation Science Stage 6 Syllabus](https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-science/investigating-science-2017) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2017.

### Learning intentions and success criteria

The learning intentions and success criteria below are a guide and may be adapted to meet your students’ needs.

Students:

* write an evidence-based discussion on how conflicts of interest can result in scientific evidence being suppressed, misinterpreted or misrepresented and how measures to counteract such conflicts can be implemented.

Students will:

* analyse evidence to identify conflicts of interest
* identify areas of misuse of scientific evidence
* discuss methods to counteract conflicts of interest
* identify key features of an analytical exposition (or discussion)
* write an analytical exposition.

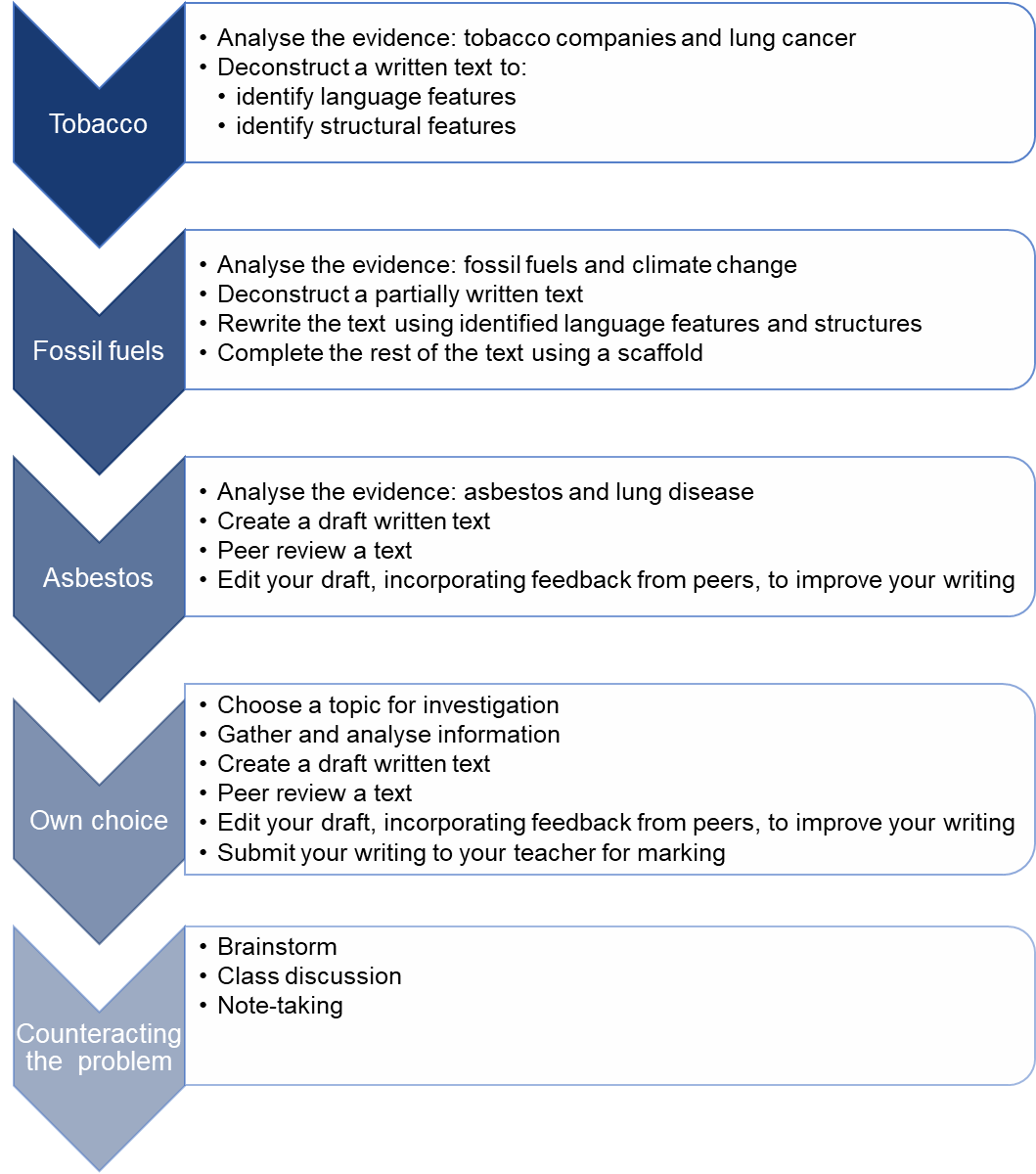
**Differentiation consideration:** learning intentions should not be differentiated. All students need access to the same core content, big ideas and concepts. Differentiation should be evident in the success criteria, or the activities/support needed to achieve the success criteria (Wiliam and Leahy 2015). Teachers may co-construct the success criteria with students or adjust them to suit their class context, for example, using the strategies and resources for curriculum planning on the [Planning, programming and assessing 7-12](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12) webpage.

As this learning sequence focuses on developing writing skills, its representation must not be adjusted. It targets analytical exposition, register, passive voice and evaluative language. These language features should be used judiciously to enhance the writing without losing the impact of the content. The focus areas may be adjusted to suit the needs of your class. For example, passive voice may be removed as a focus area or changed to a different one to better suit your class’s needs. For more information and support on these grammatical features and teaching writing skills, access the [Writing in Secondary Resource Hub](https://schoolsnsw.sharepoint.com/sites/WiSresourcehub).

## Teaching and learning activities

### Learning activity map

Figure 1 – learning activity map



### Conflict of interest

Develop a class definition of ‘conflict of interest’.

A conflict of interest is when someone faces 2 or more competing interests. This may result in actual or perceived bias.

Conflicts of interests may be caused by:

* having a published opinion
* personal or family relationships
* financial interests.

### Activity 1 – the tobacco industry and lung cancer

#### Part 1

Introduce the topic of the tobacco industry and lung cancer by watching [Big Tobacco's Saying Sorry (Because They Legally Have To) (4:15)](https://youtu.be/wkN7ahmBI5k) and discuss the key issue involved.

**Note:** ensure closed captions are on when watching all videos in this lesson sequence.

Students must be explicitly taught how to read scientific journal articles. The sections do not need to be read in the order that appears in scientific papers. It is suggested to read the abstract and introduction, followed by the conclusion. Then, go back and look at the discussion. The first journal article should be read using whole class-supported reading or the ‘Think aloud’ technique which is outlined in [Using context to infer the meaning of unfamiliar vocabulary](https://resources.education.nsw.gov.au/detail/V-07). Give students the role of reading as a scientist looking for evidence in the text. Guide them through the identification of the language used in the text, particularly the style of writing and evaluative language. This can be used to create a bank of terms that can be used when they are creating their own responses.

**Differentiation considerations:** some of the vocabulary in this lesson sequence is complex and will be unfamiliar to EAL/D students. Provide visual stimuli to support students’ understanding, see [IS Focus on writing - conflict of interest supporting PowerPoint](https://education.nsw.gov.au/teaching-and-learning/curriculum/science/planning-programming-and-assessing-science-11-12/investigating-science) for examples.

Consider providing a glossary of key terms to students in advance so that they can familiarise themselves with new words and terms and translate them if needed. Note that some students will be unfamiliar with some vocabulary in the video. Address this by pre-teaching the vocabulary such as ‘fess up’ and ‘federal court’. This could be turned into a cloze activity to develop listening skills. Encourage students to look up definitions in their home language to reinforce understanding.

Discuss the importance of secondary sources being both valid and reliable. Brainstorm ways that this could be achieved.

The [CRAAP](https://ecu.au.libguides.com/information-essentials/evaluation-tests) test can be used to assess validity. First, watch the video [Study Help: Evaluating Information (3:16)](https://youtu.be/2U3dkTLjuvE), then guide the students through the CRAAP test to assess the validity of the sources provided in the student worksheet. The sources range from media coverage to academic papers.

The reliability of a secondary source can be improved by:

1. comparing it to another source and ensuring the information is consistent
2. checking that it is peer reviewed
3. checking the list of references.

The students should analyse multiple sources to encourage them to look for reliability in secondary sources.

* Guide the students through the process of skimming and scanning the documents to create a short summary.
* Read the introduction from the first text together.
* Identify language that may be new or challenging for students.
* Discuss the meaning of the language and vocabulary and why it is used.
* Develop a word bank of key words that you have identified as a class. This should include both content vocabulary and evaluative language.
* Discuss key grammatical features such as register and the use of passive voice.
* Identify key content that should be summarised and guide students through the note-taking process. [Main idea and theme (PDF 2.1 MB)](https://education.nsw.gov.au/content/dam/main-education/en/home/teaching-and-learning/curriculum/literacy-and-numeracy/teaching-and-learning-resources/teaching-strategies/stage-5/reading/s5-reading-main-idea-and-theme.pdf) is a guide to student note-taking and may be used to support this process.
* Continue with the rest of the text.

**Differentiation consideration:** it may not be important to read the whole text as it could become a cognitive burden. Identify the key areas necessary to focus on for the task.

Summaries could be created in home languages.

Some students may need the text to be chunked into manageable parts so it is not overwhelming for them.

#### Part 2

Guide the students through a deconstruction of a sample response to the question: ‘Tobacco companies have funded several scientific studies. Evaluate the impact of this on the victory of the tobacco industry.’

Focus on the structure and purpose of an analytical exposition, the use of passive voice, evaluative language and register. A PowerPoint has been provided and can be used with the class for this part of the activity. This part of the lesson should be conducted as a whole class with explicit teaching and modelling. A scaffold for resource evaluation and Cornell note-taking can be found in the [appendix.](#_Cornell_note-taking_template)

**Additional resources:**

For further reading, see the resources below:

* [The Philip Morris-funded Foundation For A Smoke-Free World](https://www.tobaccofreekids.org/what-we-do/industry-watch/pmi-foundation/compilation)
* [Scientific paper claiming smokers less likely to acquire Covid retracted over tobacco industry links](https://www.theguardian.com/science/2021/apr/22/scientific-paper-claiming-smokers-less-likely-to-acquire-covid-retracted-over-tobacco-industry-links)
* [Lung Cancer Screening Trial Financed by Tobacco-Funded Foundation, Sparks Debate](https://academic.oup.com/jnci/article/100/10/690/905461)
* [Is there a smoker’s paradox in COVID-19?](https://ebm.bmj.com/content/26/6/279)

#### Deconstructing the question and a sample response

Tobacco companies have funded several scientific studies. Evaluate the impact of this on the victory of the tobacco industry.

Model deconstructing the question and sample response for the class. The keywords for discussion have been highlighted. A copy of the text is included in the student resources for annotation. Points to discuss include the structure of an analytical exposition, using passive voice, evaluative language and the register. The accompanying PowerPoint presentation may be used to support this activity. What kind of language will I need to use to answer this question. Discuss with students the purpose and effect of using passive voice and evaluative language in the text.

##### Text deconstruction

Components of an analytical exposition:

* **Background** – introduces the issue and provides a context.
* **Thesis statement** (statement of position) – clearly states your position on the issue and previews arguments that will be expanded on later in the text.
* **Arguments –** supports for your position, usually beginning with the most important argument (each argument consists of a claim, evidence and reasoning). Note: there may be more than one paragraph in an argument.
* **Conclusion** – reinforces your position.

**Key:**

* Passive voice
* Evaluative language

Figure 2 – sample response part 1

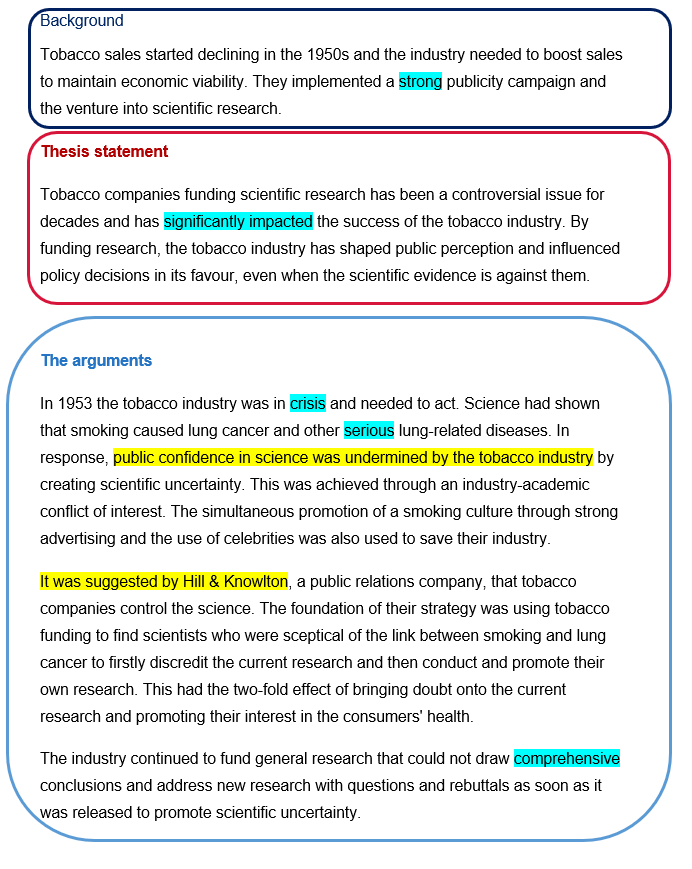
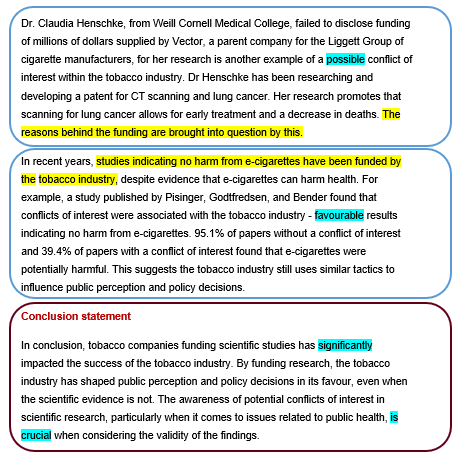


Figure 3 – sample response part 2



##### Questions to discuss

1. What content is being shared in this text?
2. What is the purpose of this piece of writing?
3. Who is the target audience for this piece of writing?
4. How does this impact the writing's register and level of formality (that is, the use of passive voice)?

An explanation of the purpose of an analytical exposition should be provided as part of this discussion – ‘to persuade people to a particular point of view, using evidence and reasoning’.

**Differentiation:** the scientific journal articles are lexically dense, supported reading is suggested along with targeted support for individuals as required. Provide opportunities for students to discuss their understanding using their home language. There are more readily accessible articles that could be used in the additional resources, however they require discussion on reliability and the need to use care when using media sources.

A list of evaluative terms may be useful to support students.

### Activity 2 – the fossil fuel industry and climate change

Introduce the topic by watching [The Fossil Fuel Industry Wants You to Think It's Solving Climate Change (7:36)](https://youtu.be/dVHx0_6tNDM). Ask students to note 3 main ideas in the video. Discuss issues that are raised in small groups or as a class.

**Note:** you may need to listen to this video twice. Provide background information and key vocabulary before viewing. Consider providing a listening scaffold for use when viewing the video.

This activity is a joint construction of an analytical exposition. It builds on skills developed in Activity 1. The learning activities focus on the text's structure, the use of passive voice, evaluative language and register. Encourage students to add to their word bank as they read the articles.

The students will read 5 articles. They will then choose 3 articles to evaluate using the CRAAP test and assess for reliability. The students then deconstruct the question and develop a partial response before completing the exposition.

#### Deconstructing the question

1. **Deconstruct the question – what do you need to know to answer the question? Make a list.**

The fossil fuel industry is an influential industry that powers countries. Leaders within the industry have been aware of the link between fossil fuels and climate change for decades. Evaluate the impact of the fossil fuel industry using their own scientists to study climate change.

**Sample answer:**

Highlight key ideas that should be addressed in the response.

Key: focus area 1

focus area 2

verb that is to be addressed in the response

relationship between focus areas that should be explored

* What did the fossil fuel industry know?
* How long have they known?
* What is the link between fossil fuels and climate change?
* What is the evidence of this (how do we know)?
* What is the impact on climate change?
* Why would they use their own scientists?
* Evidence of the impact.

#### Deconstructing the text

The first paragraph of an analytical exposition has been written for deconstruction by the students. The next 2 paragraphs are to be rewritten in the correct format of an analytical exposition. Then, following the scaffold, the students will write the rest of the text by themselves.

The success of the fossil fuel industry relies heavily on continued consumer demand to maintain profitability, viability and influence. Active confusion of the science and promotion of misinformation has led to detrimental delays in implementing climate change policy.

1. What is the register of the paragraph (how the author speaks to the audience)? Formal, informal, colloquial? Justify your decision.

**Sample answer:** The register of the text is formal. This is signified using passive voice, complex sentences, and the lack of colloquial language.

1. Evaluative language judges the worth of something – it places a value on the object. ‘Heavily’ puts a value on how much the fossil fuel industry relies of consumer demand. **Highlight ‘heavily’ in green.**
2. Highlight 2 more examples of evaluative language in green.

#### Reconstructing a text

##### Part A

The second paragraph of an analytical exposition is the ‘thesis statement’ or statement of position. It indicates your position on the issue and previews arguments to be expanded later in the text.

Compare the 2 thesis statements below.

**Text A:** So, fossil fuel companies have had a major say in what people think about climate change. Even though there’s a heap of scientific evidence connecting fossil fuel emissions to climate change, these companies have spent much money trying to make people unsure about the science and put off doing anything about it.

**Text B:** Fossil fuel industries have shaped public understanding and perceptions of climate change. Despite scientific evidence linking fossil fuel emissions to climate change, the industry has invested in efforts to cast doubt on the scientific consensus and delay action on climate change.

1. How are they similar?

**Sample answer:** Both texts show that the fossil fuel industry has impacted society’s understanding of climate change resulting in delayed action.

1. How are they different?

**Sample answer:** Text A is written using an informal style, and Text B uses formal writing. Text B does not have evaluative language.

1. Which text is more suited to an analytical exposition? Why?

**Sample answer:** Text B, as it is written using formal language.

1. Evaluative language has been left out of text B. Rewrite the text including evaluative language.

**Text B:** Fossil fuel industries have **significantly** shaped public understanding and perceptions of climate change. Despite **overwhelming** scientific evidence linking fossil fuel emissions to climate change, the industry has invested **heavily** in efforts to cast doubt on the scientific consensus and delay action on climate change.

Part B

So, the fossil fuel industry has been using science to mess with our understanding of climate change. They’ve been paying big money to groups like the Global Climate Coalition to do the research for them and share info about climate change. However, they say humans are causing climate change and spreading fake news so we don’t believe the real scientists anymore. It’s not cool.

**Sample answer:** One of the most significant ways the fossil fuel industry has used science to impact our understanding of climate change is by funding research that casts doubt on the scientific consensus. Millions of dollars have been donated by fossil fuel companies such as the Global Climate organisations to conduct research and disseminate information about climate change. These organisations often downplay the role of human activities in causing climate change, promote false or misleading information, and attack the credibility of climate scientists.

#### Finishing it off – sample response

Table 1 – scaffold for analytical exposition with sample response

|  |  |
| --- | --- |
| Points to consider | Sample response |
| ****Argument 2 – points to consider:****  What is being done to influence science or society?  What is the evidence of this?  What is the impact? | Public relations campaign  Seed doubt about the science  Shape opinion and policy  The US did not sign the Kyoto Protocol |
| ****Write paragraph 4**** | Another way the fossil fuel industry has also impacted our understanding of climate change is by using public relations campaigns. Scientific data and language are used to shape public opinion and policy favouring the fossil fuel industry. For example, in the 1990s, the American Petroleum Institute created a public relations campaign to promote the idea that the science behind climate change was uncertain and that it was too early to take action to reduce greenhouse gas emissions. This resulted in the US not signing the Kyoto Protocol. |
| ****Argument 3 – points to consider:****  What is being done to influence science or society?  What is the evidence of this?  What is the impact? | * The coal industry is Australia’s 2nd biggest exporter * Coal towns are swinging à power * Australia is an outlier in reducing pollution * Emissions targets are half that of the UK and US * LPG is seen as an alternative |
| ****Write paragraph 5**** | The coal industry is Australia’s second-largest export. Coal towns depend on the industry, so the political sway in these areas is often influenced by those with a vested interest in coal power. Despite global efforts to reduce pollution and mitigate climate change, Australia is an outlier in its approach, with emissions targets that are half those of both the United Kingdom and the United States. Although it is acknowledged that there is a need to move away from coal, the prominent alternative, LPG, is a fossil fuel with associated detrimental effects on climate. |
| ****Conclusion – points to consider:****  What is your position?  Why? (give short reasons supporting your position) | * A successful campaign using science, cherry-picking and greenwashing * Conspiracy theory/sceptic * Influenced policy * Slowed our response to climate change |
| ****Write your conclusion**** | In conclusion, the fossil fuel industry has used science to significantly impact our understanding of climate change by funding research and public relations campaigns that promote a sceptical view of the scientific consensus. The industry has also successfully influenced public policy and regulations related to climate change and employed various tactics to undermine climate science and the scientists who conduct it. As a result, action to address climate change has been delayed, which has put the planet at risk and contributed to the current climate crisis. |

**Additional resources:**

For further reading, see the resources below:

* [Conflicts Of Interest And Undue Influence In Climate Action](https://www.transparency.org/en/publications/conflicts-of-interest-and-undue-influence-in-climate-action): Putting A Stop To Corporate Efforts Undermining Climate Policy And Decisions
* [How vested interests tried to turn the world against climate science](https://www.theguardian.com/environment/2019/oct/10/vested-interests-public-against-climate-science-fossil-fuel-lobby)
* [Shell Grappled with Climate Change 20 Years Ago, Documents Show](https://www.scientificamerican.com/article/shell-grappled-with-climate-change-20-years-ago-documents-show/)
* [Climate change denial won’t even benefit oil companies soon](https://www.theguardian.com/commentisfree/2018/jul/31/climate-change-denial-oil-companies-fossil-fuels)
* [Tweet the Story of the Fossil Fuel Industry's Climate Deception](https://www.ucsusa.org/global-warming/fight-misinformation/tweet-facts-about-fossil-fuel-industry-climate-change-deception)
* [Holding Major Fossil Fuel Companies Accountable for Nearly 40 Years of Climate Deception and Harm](https://www.ucsusa.org/global-warming/fossil-fuel-companies-knew-about-global-warming)

**Differentiation:** students may be extended or supported in this activity as required. For example, they may be supported through paired reading and completing the writing task in pairs.

Small groups may be targeted to remain at the modelling stage for parts of this activity, with teacher support being decreased as the lesson progresses.

Students may be provided with suggestions of words to add to the text, such as: significant, overwhelming or heavy.

Students may be provided opportunities to complete the task with less scaffolding if it is not required.

### Activity 3 – asbestos mining and lung cancer

**This topic can be introduced by watching** [Asbestos Poisoning: Causes, Symptoms and Treatments (3:07)](https://youtu.be/-7nraUdAPyQ)**, which outlines asbestos and it’s impact on lungs.**

**The students will deconstruct the question, evaluate and summarise secondary sources and create a draft response to the question. Encourage students to continue building their word bank.**

Asbestos miners were exposed to raw asbestos for extended periods of time. Evaluate the impact of the conflict of interest between asbestos mining companies and lung cancer.

The students will have their work peer-reviewed before editing and submitting it for feedback. Explicit instruction on effective peer review is necessary. For example, the instruction could include what features to look for, how to call them out and the importance of providing both warm and cool feedback.

**Additional resources:**

For further reading, see the resources below:

* [James Hardie accused of using 'same old tricks' to avoid asbestos compensation - ABC News](https://www.abc.net.au/news/2018-02-05/james-hardie-up-to-same-old-tricks-on-asbestos-compensation/9391708)
* [Asbestos-related diseases in mineworkers: a clinicopathological study](https://openres.ersjournals.com/content/3/3/00022-2017)
* [Revealed: Global giant Caesarstone knew of silicosis threat to Gold Coast and Queensland stonemasons - Silicosis Support Network](https://www.silicosissupport.org.au/revealed-global-giant-caesarstone-knew-of-silicosis-threat-to-gold-coast-and-queensland-stonemasons/)
* [The Traumatic History of Asbestos in Australia - Alpha Environmental](https://www.alphaenvironmental.com.au/traumatic-history-asbestos-australia/)
* [Battling James Hardie | The Australian Asbestos Network](https://www.australianasbestosnetwork.org.au/asbestos-history/battles-2/battling-james-hardie/)

**Differentiation:** scaffolding may be adjusted or removed as required by your students. Students may be supported through the paired reading technique or by completing the activity in small groups. Sentence starters or sentence frames may be added to the scaffold to support students.

Encourage the use of the students’ home language in discussions and small group work and paired reading to support language development.

You may choose to focus on one language feature by altering the scaffold.

#### Sample response

Asbestos is a naturally occurring mineral used widely in construction and manufacturing. The perceived success of the construction industry relied upon the strength, flexibility and affordability of asbestos. The additional benefits of the insulation properties of asbestos further enhanced the essentialness of the product to the construction industry.

There is strong evidence that inhaling asbestos fibres contributes to various lung diseases, including lung cancer and mesothelioma. The impact can be observed in miners, military workers, exposed workers and consumers. Despite this knowledge, the use of asbestos in Australia was not banned until 2003, and some countries continue to mine and use asbestos. In fact, several companies are lobbying in the US to promote legislation denying compensation to people with asbestosis.

One of the primary reasons for the conflict of interest between the asbestos industry and lung disease is the cover-up of the health risks associated with asbestos exposure. The link between asbestos and disease has been observed since 1900, when asbestos fibres were found in the lungs of a factory worker. In 1918, the US Bureau of Statistics noticed an increasing number of unusual deaths among asbestos workers. Dr Arthur Vorwald, an industry scientist working for Exxon, found that asbestos caused asbestosis in 1948. This warning was reinforced in 1958 by M.C.M Pollard. Exxon concealed this crucial advice, and no action was taken, resulting in the continued mining and use of asbestos.

The corruption of the integrity of scientific research continues. For example, in 2009, research supporting the safety of asbestos was conducted by Dr Bernstein, an industry-funded scientist, which contradicts the research of independent scientists. Although his research was supported by scientists working for Kevlar, independent scientists claim the results obtained can be explained through the pre-treatment of fibres which will reduce the impact. This example of how research can be manipulated to ensure favourable findings and sow doubt when a conflict of interest is rife within the industry. Furthermore, Ford spent over $40 million to imbue doubt and deflect responsibility away from them and their use of asbestos in brake pads.

Hill and Knowlton, a public relations company that successfully turned the tobacco industry around, were hired by the U.S. Gypsum Company to shift public perception. They also suggested the creation of The Safe Buildings Alliance to enable construction companies to pool resources against critics and to deflect attention away from individual companies. Instead, the industry continues to fund research, sow doubt, deflect responsibility and lobby for the use of asbestos.

The impact of conflict among science researchers has been far-reaching. The conflicts have contributed to delays in regulatory action and hindered efforts to protect workers. Despite overwhelming evidence of its dangers, asbestos continues to be used. There are still up to 700 deaths annually in Australia and 15 000 in the US each year. It is important to acknowledge these conflicts and work towards greater transparency and objectivity in asbestos research to protect the health and safety of workers and the wider public.

### Activity 4 – commercial industries researching products for market

In this lesson, students will brainstorm topics for this activity as a class. The students will then select a topic to conduct individual research, develop a question and write an analytical exposition.

There are a variety of topics that could be covered in this point. Guide students to follow their area of interest and provide support while they develop research skills.

Possible areas for research include dietary supplements, alternative health therapies, coal seam gas and pharmaceutical companies.

**Possible resources:**

This is a list of resources that could be used for this activity.

* [Swallowing It – Four Corners video (45:00)]](https://www.abc.net.au/news/2017-02-13/swallowing-it/8267014)
* [Conflict of Interests in the Scientific Production on Vitamin D and COVID-19: A Scoping Review](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9320027/)
* [Does Regulating Dietary Supplements as Food in a World of Social Media Influencers Promote Public Safety?](https://journalofethics.ama-assn.org/article/does-regulating-dietary-supplements-food-world-social-media-influencers-promote-public-safety/2022-05)
* [Medical merchants: conflict of interest, office product sales and notifiable conduct](https://www.mja.com.au/journal/2011/194/1/medical-merchants-conflict-interest-office-product-sales-and-notifiable-conduct)
* [Influencer Marketing for Dietary Supplements](https://www.refersion.com/blog/influencer-marketing-dietary-supplements/)
* [Selling health and happiness how influencers communicate on Instagram about dieting and exercise: mixed methods research](https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7387-8)
* [Knowledge, Attitudes and Practices (KAP) Relating to Dietary Supplements Among Health Sciences and Non-Health Sciences Students in One of The Universities of United Arab Emirates (UAE)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5071968/)
* [Unconventional Gas: Coal Seam Gas](https://www.lockthegate.org.au/about_coal_seam_gas?gclid=CjwKCAjw5dqgBhBNEiwA7PryaAj5k0nS1-OkuZner2iollpTqyeV5D5rJ_VwVqfoleAzq0AQV9XPcBoCtl8QAvD_BwE) Rsiks

**Differentiation:** students should be able to conduct this activity without scaffolding. However, a modified scaffold may be provided to students requiring extra support.

Some students may be able to identify a question to address, however they may need support to formulate an effective question.

Some students may need to be provided with a topic and a question to complete the activity. It is suggested that students may be able to work in small groups to determine their area of research and create the question if additional support is required. Individual support at the point of need may also be required.

The use of home language to conduct research could be encouraged.

#### Activity 4 marking guidelines

Table 2 – Activity 4 marking criteria

|  |  |  |  |
| --- | --- | --- | --- |
| Criteria | Working towards | Satisfactory | Excelling |
| Background | The background is vague or inadequate. | The background is satisfactory but not fully developed | The background is concise and well-developed. |
| Thesis statement | The thesis statement is vague or inadequate | The thesis statement is satisfactory but not fully developed | The thesis statement is concise and well-developed. |
| Argument development | The ideas lack coherence and relevance. Ideas are not linked back to the topic. | The argument has adequate supporting evidence but lacks analysis. Links back to the question are present but lack clarity. | Comprehensive and well-developed arguments are presented and supported with evidence. |
| Conclusion | The conclusion is vague or inadequately summarised. | The conclusion summarises and supports the argument. | The conclusion is compelling and insightful. |
| Clarity of writing | Writing is disorganised or difficult to follow, with numerous grammar, punctuation and spelling errors. | Writing is clear and easy to follow, with few grammar, punctuation and spelling errors. | Writing conveys understanding concisely, with no grammar, punctuation or spelling errors. |
| Register | Limited or no use of formal register. | A formal register is used throughout the text. | A formal register is used effectively throughout the text. |
| Passive voice | Limited or no use of passive voice. | Passive voice is used throughout the text. | Passive voice is used effectively throughout the text. |
| Evaluative language | Limited or no use of evaluative language. | Evaluative language is used throughout the text. | Evaluative language is used effectively throughout the text. |

### Activity 5 – addressing conflicts of interest

Conduct a student-centred discussion on methods of counteracting conflicts of interest in science. Focus on the areas of conflict addressed in this lesson sequence, then broaden the application of ideas. Evaluate 3 methods that may be used to reduce conflict of interest. This information could be presented as a table, a written discussion or informal notes.

**Teacher notes:** collaboration between students may be encouraged using a Jamboard for brainstorming, Think-Pair-Share or Round Robin. This will also support the learning of students from EAL/D backgrounds.

Sample answer:

Table 3 – examples of ways to manage conflicts of interest

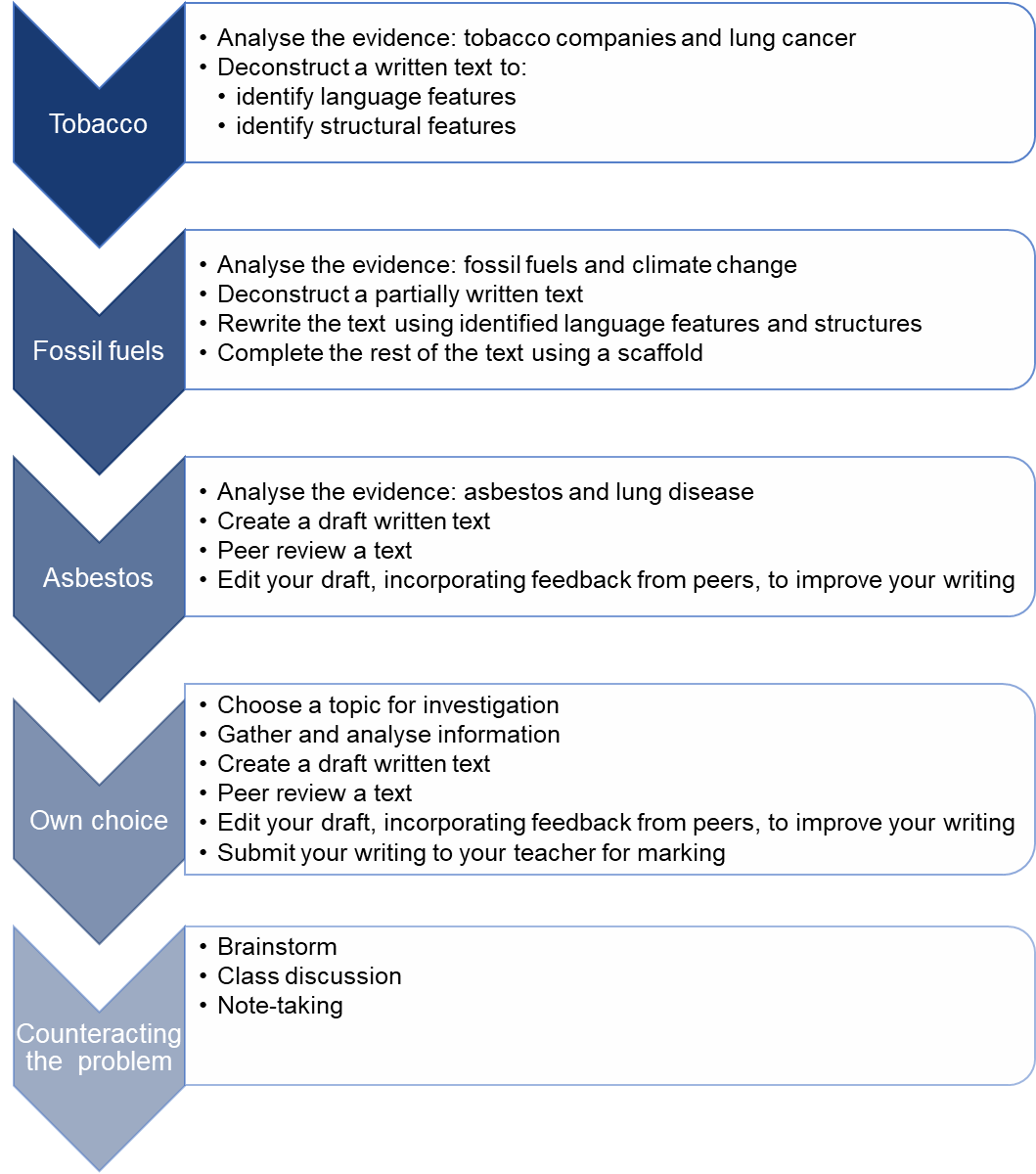
|  |  |  |  |
| --- | --- | --- | --- |
| Strategy | Description | Pros | Cons |
| Disclosure | Financial, personal or professional interests should be disclosed. | This allows for transparency and management of possible conflicts. | It relies upon the honesty of the involved parties. |
| Legislation and other regulations | Pharmaceutical or biotechnology firms must submit data to the Therapeutic Goods Administration TGA to gain approval for new products.  The EPA governs the marketing and research of pesticides. | These regulations serve to protect public health and safety. | Legislation may slow the rate of new discoveries or prevent certain research activities from being conducted altogether. |
| Peer review | Peer review of research ensures validity and improves the reliability of the research. | Increase confidence in the results of the research. | This process may slow down the publication of important articles. It also instils competition, causing some research to resort to deceit and data falsification. |

**Extension opportunity:** following the class discussion, the students could be extended by conducting further research considering proactive and reactive approaches to addressing conflicts of interest in scientific research. The students could use examples to evaluate at least 2 different methods used to manage conflict of interest.

## Student resources

### Learning map

Figure 4 – learning map



### Activity 1 – the tobacco industry and lung cancer

#### Part 1

When conducting research, both primary and secondary sources, it is important that the research is both valid and reliable. The [CRAAP](https://ecu.au.libguides.com/information-essentials/evaluation-tests) test can be used to assess validity. The reliability of a secondary source can be improved by:

1. comparing it to another source and ensuring the information is consistent
2. checking that it is peer reviewed
3. checking the list of references.

#### Gathering information

Scan each of the following articles.

* [Inventing Conflicts of Interest: A History of Tobacco Industry Tactics](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3490543/)
* [A conflict of interest is strongly associated with tobacco industry–favourable results, indicating no harm of e-cigarettes](https://www.sciencedirect.com/science/article/abs/pii/S0091743518303864)
* [Tobacco giants lobby PM and key MPs with pro-vaping message](https://www.abc.net.au/news/science/2020-01-10/tobacco-industry-sought-vaping-meetings-with-pm-and-cabinet/11855264?utm_source=sfmc&utm_medium=email&utm_content=&utm_campaign=%5bspecialist_sfmc_15_01_19_science%5d%3a125&user_id=c9291f77aff62e510b56c5ff27bf0a9273adf5005dfcab6d2fe6bc0925d624fc&WT.tsrc=email&WT.mc_id=Email|%5bspecialist_sfmc_15_01_19_science%5d|125https%3a%2f%2fwww.abc.net.au%2fnews%2fscience%2f2020-01-10%2ftobacco-industry-sought-vaping-meetings-with-pm-and-cabinet%2f11855264)

1. Assess each one using the CRAAP test.
2. Assess each document for reliability. (Is the same information in multiple articles? Check the references, has the article been peer reviewed?)
3. Skim and scan each article (do not read the whole article). Highlight key points that refer to tobacco companies, finance, conflict of interest.
4. Read key parts of the article more carefully and create a summary using the [Cornell notes format](#_Cornell_note-taking_template_1).
5. Create a word bank as you read. Include new words and key words that convey meaning in the text. Look for evaluative language and how it is used in these texts.

##### Resource evaluation

Table 4 – table for resource evaluation

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Article | Currency | Relevance | Authority | Accuracy | Purpose | Reliability | Justification for assessment of reliability |
|  |  |  |  |  |  |  |  |
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##### Vocabulary

When you read text, you should be reading as a scientist. This means that you are looking for evidence in the text.

As you engage in the texts, create a word bank. The purpose of the word bank is to identify key terms that you are unfamiliar with.

Table 5 – word bank – key terms

|  |  |  |  |
| --- | --- | --- | --- |
| Word | Home language | Meaning | How it is used |
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Table 6 – word bank – evaluative language

|  |  |  |  |
| --- | --- | --- | --- |
| Word | Home language | Meaning | How it is used |
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##### Cornell note-taking template

Table 6 – Cornell note-taking template

|  |  |
| --- | --- |
| **Date:** | **Topic:** |
| **Source:** |  |
| **Keyword** | **Details** |
|  |  |
|  |  |
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|  |  |
| **Summary:** |  |

#### Part 2

#### Deconstructing the question and a sample response

Tobacco companies have funded several scientific studies. Evaluate the impact of this on the victory of the tobacco industry.

This question asks for an evaluation and can be structured as an analytical exposition (a one-sided argument). Deconstruct this sample response looking for structural and language features.

Tobacco sales started declining in the 1950s and the industry needed to boost sales to maintain economic viability. They implemented strong publicity campaigns and the venture into scientific research.

Tobacco companies funding scientific research has been a controversial issue for decades, and has significantly impacted the success of the tobacco industry. By funding research, the tobacco industry has shaped public perception and influenced policy decisions in its favour, even when the scientific evidence is against them.

In 1953, the tobacco industry was in crisis and needed to act. Science had shown that smoking caused lung cancer and other serious lung-related diseases. In response, public confidence in science was undermined by the tobacco industry by creating scientific uncertainty. This was achieved through an industry-academic conflict of interest. The simultaneous promotion of a smoking culture through strong advertising and the use of celebrities was also used to save their industry.

It was suggested by Hill & Knowlton, a public relations company, that tobacco companies control the science. The foundation of their strategy was using tobacco funding to find scientists who were sceptical of the link between smoking and lung cancer to firstly discredit the current research and then conduct and promote their own research. This had the two-fold effect of bringing doubt onto the current research and promoting their interest in the consumers’ health.

The industry continued to fund general research that could not draw comprehensive conclusions and address new research with questions and rebuttals as soon as it was released to promote scientific uncertainty.

Dr Claudia Henschke, from Weill Cornell Medical College, failed to disclose funding of millions of dollars supplied by Vector, a parent company for the Liggett Group of cigarette manufacturers, for her research is another example of a possible conflict of interest within the tobacco industry. Dr Henschke has been researching and developing a patent for CT scanning and lung cancer. Her research promotes that scanning for lung cancer allows for early treatment and a decrease in deaths. The reasons behind the funding are brought into question by this.

In recent years, studies indicating no harm from e-cigarettes have been funded by the tobacco industry, despite evidence that e-cigarttes can harm health. For example, a study published by Pisinger, Godtfredsen and Bender found that conflicts of interest were associated with the tobacco industry – favourable results indicating no harm from e-cigarettes. 95.1% of papers without a conflict of interest and 39.4% of papers with a conflict of interest, found that e-cigarettes were potentially harmful. This suggests the tobacco industry still uses similar tactics to influence public perception and policy decisions.

In conclusion, tobacco companies funding scientific studies has significantly impacted the success of the tobacco industry. By funding research, the tobacco industry has shaped public perception and policy decisions in its favour, even when the scientific evidence is not. The awareness of potential conflicts of interest in scientific research, particularly when it comes to issues related to public health, is crucial when considering the validity of the findings.

### Activity 2 – the fossil fuel industry and climate change

The fossil fuel industry is an influential industry that powers countries. Leaders within the industry have been aware of the link between fossil fuels and climate change for decades. Evaluate the impact of the fossil fuel industry using their own scientists to study climate change.

#### Deconstruct the question

1. **Deconstruct the question – what do you need to know to answer the question? Make a list.**
2. **Scan** each of the following articles. Select 3 to use for this activity. Scan all articles before you choose, the first 3 may not necessarily be the best.

* [Exxon Knew about Climate Change almost 40 years ago - Scientific American](https://www.scientificamerican.com/article/exxon-knew-about-climate-change-almost-40-years-ago/)
* [Climate change: Why Australia refuses to give up coal - BBC News](https://www.bbc.com/news/world-australia-57925798)
* [America Misled: How the fossil fuel industry deliberately misled Americans about climate change](https://www.climatechangecommunication.org/america-misled/)
* [The Reason Fossil Fuel Companies Are Finally Reckoning With Climate Change | Time](https://time.com/5766188/shell-oil-companies-fossil-fuels-climate-change/?fbclid=IwAR2Ctb2iC3oFMZPajNsRK1Ufjlir7EdQzARLS1tS1ffQ5udxwuZ0eXSZB3o)
* [Climate skeptic's fossil fuel funding puts spotlight on journal conflict policies | Science | AAAS](https://www.science.org/content/article/climate-skeptic-s-fossil-fuel-funding-puts-spotlight-journal-conflict-policies)

1. Assess each of your chosen texts using the CRAAP test.
2. Assess each document for reliability. (Is the same information in multiple articles? Check the references, has the article been peer reviewed?)
3. Skim and scan each article (do not read the whole article). Highlight key points that refer to fossil fuel industry, scientists, scientific research, finance, conflict of interest or misinformation. Keep in mind the question that you need to answer as you read.
4. Read key parts of the article more carefully. Add to your word bank and create a summary using the Cornell notes format. Again, keep in mind the question that you need to answer, do not waste time making notes on information that is not relevant to the question.

#### Deconstructing the text

The first paragraph in an analytical exposition is the background. It introduces the topic and provides a context.

Read the background paragraph below and answer the questions.

The success of the fossil fuel industry relies heavily on continued consumer demand to maintain profitability, viability and influence. Active confusion of the science and promotion of misinformation has led to detrimental delays in the implementation of climate change policy.

1. What is the register of the paragraph (how the author speaks to the audience)? Formal, informal, colloquial? Justify your decision.
2. Evaluative language judges the worth of something – it places a value on the object.

‘Heavily’ puts a value on how much the fossil fuel industry relies on consumer demand. Highlight ‘heavily’ in green.

1. Highlight 2 more examples of evaluative language in green.

#### Reconstructing a text

Part A

The second paragraph of an analytical exposition is the ‘thesis statement’ or statement of position. It indicates your position on the issue and previews arguments to be expanded later in the text.

Compare the 2 thesis statements below.

**Text A:** So, fossil fuel companies have had a major say in what people think about climate change. Even though there’s a heap of scientific evidence connecting fossil fuel emissions to climate change, these companies have spent a lot of money trying to make people unsure about the science and put off doing anything about it.

**Text B:** Fossil fuel industries have shaped public understanding and perceptions of climate change. Despite scientific evidence linking fossil fuel emissions to climate change, the industry has invested in efforts to cast doubt on the scientific consensus and delay action on climate change.

1. How are they similar?
2. How are they different?
3. Which text is more suited to an analytical exposition? Why?
4. Evaluative language has been left out of text B. Rewrite the text including evaluative language.

Part B

The third paragraph of an analytical exposition is the argument. It provides support for your position, usually beginning with the most important argument.

The response below has been written using informal language. Rewrite the third paragraph of this response using formal language (register), passive voice and add at least 2 evaluative terms.

So, the fossili fuel industry has been using science to mess with our understanding of climate change. They’ve been paying big money to groups like the Global Climate Coalition to do the research for them and share info about climate change. But, they are saying that humans are causing climate change and spread fake news so we don’t believe the real scientists anymore. It’s not cool.

#### Finishing it off

Use the scaffold to complete the rest of the analytical exposition.

Remember to use formal language and evaluative terms.

Table 7 – scaffold for analytical exposition

|  |  |
| --- | --- |
| Points to consider | Response |
| Argument 2 – points to consider:  What is being done to influence science or society?  What is the evidence of this?  What is the impact? |  |
| Write paragraph 4 |  |
| Argument 3 – points to consider:  What is being done to influence science or society?  What is the evidence of this?  What is the impact? |  |
| Write paragraph 5 |  |
| Conclusion – points to consider:  What is your position?  Why? (give short reasons supporting your position) |  |
| Write your conclusion |  |

### Activity 3 – asbestos mining and lung cancer

Asbestos miners were exposed to raw asbestos for extended periods of time. Evaluate the impact of the conflict of interest between asbestos mining companies and lung cancer.

1. Deconstruct the question – what do you need to know to answer the question? Make a list.
2. Scan each of the following articles. Select 3 to use for this activity. Scan all articles before you choose, the first 3 may not necessarily be the best.

* [Asbestos Industry Covered Up Danger for Decades, and Evades Responsibility Today | HuffPost Impact](https://www.huffpost.com/entry/asbestos-industry-covered_b_10322522)
* [FWRITR (researchgate.net)](https://www.researchgate.net/publication/21311828_Corruption_of_occupational_medical_literature_The_asbestos_example)
* [Expression of concern: false claim to be free of conflicts in asbestos biopersistence debate](https://www.tandfonline.com/doi/abs/10.1179/1077352512Z.00000000024?journalCode=yjoh20)
* [Asbestos and Health A Case of Informal Social Control [PDF 1,941 KB]](https://www0.anu.edu.au/fellows/jbraithwaite/_documents/Articles/Asbestos%20and%20Health%20A%20Case%20of%20Informal%20Social%20Control.pdf)
* Mesothelioma & Asbestos Worldwide

1. Assess each of your chosen texts using the CRAAP test.
2. Assess each document for reliability. (Is the same information in multiple articles? Check the references, has the article been peer reviewed?)
3. Skim and scan each article (do not read the whole article). Highlight key points that refer to fossil fuel industry, scientists, scientific research, finance, conflict of interest or misinformation. Keep in mind the question that you need to answer as you read.
4. Build your word bank with key terms, unfamiliar words and evaluative language.
5. Read key parts of the article more carefully and create a summary using the Cornell notes format. Again, keep in mind the question that you need to answer, do not waste time making notes on information that is not relevant to the question.
6. Write a draft response to the question in the form of an analytical exposition.
7. Have your work peer reviewed.
8. Review and edit your text incorporating feedback from your peers.

##### Analytical exposition scaffold

Table 8 – scaffold for writing an analytical exposition

|  |  |
| --- | --- |
| Prompts | Response |
| Background:  What is the exposition about?  What is the context of the topic? |  |
| Write paragraph 1 |  |
| Thesis statement:  What is your position on the issue?  What are the arguments that you will expand on later in the text? |  |
| Write paragraph 2 |  |
| Argument 1 – points to consider:  What is being done to influence science or society?  What is the evidence of this?  What is the impact? |  |
| Write paragraph 3 |  |
| Argument 2 – points to consider:  What is being done to influence science or society?  What is the evidence of this?  What is the impact? |  |
| Write paragraph 4 |  |
| Argument 3 – points to consider:  What is being done to influence science or society?  What is the evidence of this?  What is the impact? |  |
| Write paragraph 5 |  |
| Conclusion – points to consider:  What is your position?  Why? (give short reasons supporting your position) |  |
| Write your conclusion |  |

##### Peer review

Table 9 – scaffold for peer review

|  |  |  |
| --- | --- | --- |
| Criteria | Present/ not present | Comment |
| Analytical exposition structure – background, thesis statement, argument 1–3, conclusion |  |  |
| Background information – is concise and well developed |  |  |
| Thesis statement – is concise and well developed |  |  |
| Argument – comprehensive and well-developed arguments are presented and supported with evidence |  |  |
| Conclusion – the conclusion is compelling and insightful |  |  |
| Register – formal language used throughout the text |  |  |
| Nominalisation – is used effectively throughout the text |  |  |
| Evaluative language – is used effectively throughout the text |  |  |
| Clarity of writing (reads well) – writing effectively conveys meaning in a concise manner with no errors in grammar, punctuation and spelling |  |  |

### Activity 4 – commercial industries researching products for market

1. Brainstorm topics for this activity.
2. Find at least 3 articles on your chosen topic.
3. Assess the articles for validity and reliability.
4. Create a summary of the articles using Cornell notes.
5. Create a question around your chosen topic. Keep it simple, for example, ‘Evaluate the impact of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_’.
6. Write an analytical exposition in response to your question.

### Activity 5 – addressing conflicts of interest

Table 10 – evaluation of strategies used to manage conflicts of interest

|  |  |  |  |
| --- | --- | --- | --- |
| Strategy | Description | Pros | Cons |
| Disclosure |  |  |  |
| Legislation and other regulations |  |  |  |
| Peer review |  |  |  |

## Appendix

Table 11 – table showing the structure and grammar of an analytical exposition through a sample response to Activity 1, Part 2

|  |  |
| --- | --- |
| **Paragraph** | **Text** |
| **Background** | Tobacco sales started declining in the 1950s and the industry needed to boost sales to maintain economic viability. They implemented a strong publicity campaigns and the venture into scientific research. |
| **Thesis statement** | Tobacco companies funding scientific research has been a controversial issue for decades, and has significantly impacted the success of the tobacco industry. By funding research, the tobacco industry has shaped public perception and influenced policy decisions in its favour, even when the scientific evidence is against them. |
| **Argument 1** | In 1953 the tobacco industry was in crisis and needed to act. Science had shown that smoking caused lung cancer and other serious lung-related diseases. In response, public confidence in science was undermined by the tobacco industry by creating scientific uncertainty. This was achieved through an industry-academic conflict of interest. The simultaneous promotion of a smoking culture through strong advertising and the use of celebrities was also used to save their industry.  It was suggested by Hill & Knowlton, a public relations company, that tobacco companies control the science. The foundation of their strategy was using tobacco funding to find scientists who were sceptical of the link between smoking and lung cancer to firstly discredit the current research and then conduct and promote their own research. This had the two-fold effect of bringing doubt onto the current research and promoting their interest in the consumers' health.  The industry continued to fund general research that could not draw comprehensive conclusions and address new research with questions and rebuttals as soon as it was released to promote scientific uncertainty. |
| **Argument 2** | Dr Claudia Henschke, from Weill Cornell Medical College, failed to disclose funding of millions of dollars supplied by Vector, a parent company for the Liggett Group of cigarette manufacturers, for her research is another example of a possible conflict of interest within the tobacco industry. Dr Henschke has been researching and developing a patent for CT scanning and lung cancer. Her research promotes that scanning for lung cancer allows for early treatment and a decrease in deaths. The reasons behind the funding are brought into question by this. |
| **Argument 3** | In recent years, studies indicating no harm from e-cigarettes have been funded by the tobacco industry, despite evidence that e-cigarttes can harm health. For example, a study published by Pisinger, Godtfredsen, and Bender found that conflicts of interest were associated with the tobacco industry - favourable results indicating no harm from e-cigarettes. 95.1% of papers without a conflict of interest and 39.4% of papers with a conflict of interest found that e-cigarettes were potentially harmful. This suggests the tobacco industry still uses similar tactics to influence public perception and policy decisions. |
| **Conclusion** | In conclusion, tobacco companies funding scientific studies has significantly impacted the success of the tobacco industry. By funding research, the tobacco industry has shaped public perception and policy decisions in its favour, even when the scientific evidence is not. The awareness of potential conflicts of interest in scientific research, particularly when it comes to issues related to public health, is crucial when considering the validity of the findings. |

## Support and alignment

**Resource evaluation and support:** all curriculum resources are prepared through a rigorous process. Resources are periodically reviewed as part of our ongoing evaluation plan to ensure currency, relevance and effectiveness. For additional support or advice, or to provide feedback, contact the Science Curriculum team by emailing [Science7-12@det.nsw.edu.au](mailto:Science7-12@det.nsw.edu.au).

**Differentiation:** further advice to support Aboriginal and/or Torres Strait Islander students, EAL/D students, students with a disability and/or additional needs and High Potential and gifted students can be found on the [Planning, programming and assessing 7-12](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12) webpage.

**Assessment:** further advice to support formative assessment is available on the [Planning, programming and assessing 7-12](https://education.nsw.gov.au/teaching-and-learning/curriculum/planning-programming-and-assessing-k-12/planning-programming-and-assessing-7-12) webpage.

**Professional learning:** relevant professional learning is available on the [Science statewide staffroom](https://education.nsw.gov.au/teaching-and-learning/curriculum/statewide-staffrooms), and [HSC Professional Learning](https://education.nsw.gov.au/teaching-and-learning/professional-learning/hsc-pl). [Stage 6 Literacy in context](https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/teaching-and-learning-resources/literacy/stage-6-literacy-in-context-writing/science) provides further advice to teachers to improve student writing.

**Related resources:** further resources to support Stage 6 Investigating science can be found on the [HSC hub](https://www.hschub.nsw.edu.au/) and the [Science Curriculum page](https://education.nsw.gov.au/teaching-and-learning/curriculum/science).

**Consulted with:** Multicultural Education, Literacy and Numeracy and subject matter experts.

**Alignment to system priorities and/or needs**: [School Excellence Policy](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468), [School Success Model](https://education.nsw.gov.au/public-schools/school-success-model/school-success-model-explained).

**Alignment to the School Excellence Framework:** this resource supports the [School Excellence Framework](https://education.nsw.gov.au/policy-library/policies/pd-2016-0468) elements of curriculum (curriculum provision) and effective classroom practice (lesson planning, explicit teaching).

**Alignment to Australian Professional Teaching Standards:** this resource supports teachers to address [Australian Professional Teaching Standards](https://educationstandards.nsw.edu.au/wps/portal/nesa/teacher-accreditation/meeting-requirements/the-standards/proficient-teacher) 1.5.2, 2.5.2, 3.2.2, 3.3.2.

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**Resource:** Classroom resource

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## References

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[Investigating Science Stage 6 Syllabus](https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-science/investigating-science-2017) © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2017.

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