



SSHEAN

*Social Studies & History Education
in the Anthropocene Network*

Misinformation, Past & Present: Thinking Critically about Science Denial

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Lesson Challenge

In this lesson, students will learn about misinformation in different contexts in the past and the present.

Through a series of three activities, students will learn strategies to identify and respond to science denial related to the tobacco and oil industries. They will examine evidence (including cartoons and advertisements) and debunk misinformation about smoking and climate change.

Students will have the opportunity to apply their learning through a culminating activity in which they identify and respond to climate denial presented in a song.

The accompanying materials for this lesson include: a Lesson Plan (this document) for teachers, a Slideshow, an Activity Sheets package for students, and an Evidence Sheets package for students.



Inquiry Question

How can I identify and respond to misinformation and science denial?

Lesson Details

Grade Level

- Grades 7-12 and postsecondary (ages 12+)

Subject Areas

- Social studies (history, geography, civics)
- Language arts, digital media literacy
- Environmental science

Duration

- 75-120 minutes (could be expanded over multiple class meetings)

Learning Objectives

- Students will learn:
 - to identify and respond to science denial using different strategies.
 - to draw comparisons between different contexts of science denial in the past and present.
 - to notice and question how science is portrayed in various media (e.g., advertisements).

Background Knowledge

- Consider what your students have previously learned about:
 - digital media literacy.
 - the health impacts of tobacco and smoking.
 - the science behind climate change.

Vocabulary

Misinformation

False or inaccurate information that is communicated with the intention to deceive.

Science Denial

The rejection of basic facts and concepts that are undisputed, well-supported parts of the scientific consensus on a subject, in favour of radical and controversial ideas.

Debunk

To expose the falseness of something.

Fake Experts

People who appear to be experts but do not have *relevant* expertise.

Logical Fallacies

Errors in reasoning that invalidate an argument.

Impossible Expectations

Too much evidence or impossible evidence is demanded.

Cherry Picking

Focusing on select pieces of information while ignoring others.

Conspiracy Theories

Promoting the idea that an event or circumstance is the result of a secret plot by powerful people or groups.

Please note: It may be necessary for teachers to create or adapt the information in this lesson for different grades/age levels or backgrounds/context.



Summary of Activities

1. Identify science denial techniques used to promote misinformation.
2. Evaluate the accuracy of statements made about:
 - a) Tobacco use/smoking
 - b) Climate change
3. Apply strategies for debunking misinformation to various types of sources (e.g., advertisements, political cartoons, songs).
4. Compare misinformation strategies and motivations in the past and present.
5. Consider how information and perspectives are shaped by the media.

Considerations for Creating a Positive Learning Environment

Teachers are encouraged to consider the following while implementing this lesson:

- Students and/or people in their community may not believe in climate change.
- Students and/or people in their community might support smoking/vaping and participate themselves.
- Encourage students to think critically about the sources of information they have used to develop their stance on these issues (for a reputable source of information, see the IPCC reports: <https://www.un.org/en/climatechange/reports>).

Accommodations

- Provide verbal image descriptions for visually impaired students.
- Allow students to verbally complete the charts on each Activity Sheet.

Criteria & Concepts

5 Types of Science Denial (FLICC)*

- Fake experts
- Logical fallacies
- Impossible expectations
- Cherry picking
- Conspiracy theories

3 Types of Debunking*

- Fact-based
- Source-based
- Logic-based

Historical Thinking Concept(s)**

- Evidence

* Cook, J. *Cranky uncle*. www.crankyuncle.com

** Seixas, P. & Morton, T. (2013). *The big six historical thinking concepts*. Nelson. www.historicalthinking.ca



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Lesson Activity 1

In this activity students will learn about 5 types of science denial and 3 ways to debunk misinformation. They will practice identifying science denial techniques depicted in cartoon images.

Setting Up the Activity

Begin by moving through slide 2 (introduce the inquiry question), slide 3 (activate students' prior knowledge), slide 4 (review learning objectives), and slide 5 (consider key areas of background knowledge and vocabulary).

Set up the activity by explaining the 5 types of science denial ("FLICC"), using the definitions provided on page 2 of this lesson plan and slides 6 & 7 of the Slideshow.

Next, explain the 3 ways to debunk misinformation, referring to slide 8 of the Slideshow. Encourage students to think of other debunking strategies and add them to an ongoing list.

And finally, explain the historical thinking concept "evidence," which requires asking good questions about a source and making inferences, referring to slides 9 & 10 of the Slideshow.

The Activity

1. Pass out Activity Sheet 1 to all students (2 pages).
2. Instruct students to complete the two charts on the first page (5 Techniques of Science Denial, 3 Ways to Debunk Misinformation) while you are setting up the activity. You may wish to provide your own examples to explain each of the 5 science denial techniques and 3 ways to debunk misinformation.
3. View the 3 cartoons on slides 12, 13, & 14, one at a time.
4. Ask students to identify the science denial technique(s) depicted in the cartoons and write their answers on Activity Sheet 1. You may give students the option to work in pairs or small groups.
5. Ask students to explain their answers and lead a short discussion about each cartoon, if time allows.
 - Cartoon 1: Impossible expectations – requires too specific information/evidence (does it really matter if it takes 12 seconds or 15 seconds if the end result is going to be the same?)
 - Cartoon 2: Logical fallacy (straw man argument) – misrepresenting someone's argument to defeat it more easily.
 - Cartoon 3: Cherry picking – selecting certain information to build a case (his end of the ship might be going up but overall the ship is going down).

Extension

Allow some extra time for students to play a misinformation debunking game: <https://crankyuncle.com>

Estimated Time

- 15 minutes

Required Materials

- Slideshow
- Activity Sheet 1
- Cranky Uncle Website



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Lesson Activity 2

In this activity students will learn about the tobacco industry's history of science denial. They will examine smoking advertisements from the 1950s and practice identifying the science denial techniques that they depict. They will also gain practice debunking misinformation using a variety of strategies.

Setting Up the Activity

Set up the activity by introducing some background information on the history of misinformation and the tobacco industry, using slides 16 & 17. To draw relevant connections to the present, use slide 22 to discuss the similarities between the dangers of smoking and vaping (which has become an increasing health concern more recently).

The Activity

1. Pass out Activity Sheet 2 to all students.
2. View the 2 advertisements on slides 20 & 21, one at a time. You may also wish to print copies of the advertisements.
3. As a class, follow the Activity Sheet steps to:
 - a) Create a list of evidence, claim(s), or source(s) to question or check.
 - b) Identify the science denial technique(s) depicted in the ads.
 - c) Identify a strategy that could be used to debunk the misinformation.
 - d) Develop a question that you could ask to debunk the misinformation.
4. Model the processes outlined above for students and discuss each element of the Activity Sheet 2 chart in detail together as a class. If time is short, perhaps only deconstruct one image in detail.
5. Have students respond to some or all of the Thinking Questions at the bottom of the Activity Sheet 2 handout. Students should have time to think about the questions individually, then discuss as a class.

Extension

Have students identify another issue on which they could create a misinformation advertisement, create the advertisement, exchange with a partner, and complete step 3 above.

Estimated Time

- 20 minutes

Required Materials

- Slideshow
- Activity Sheet 2
- Evidence Sheet (2 advertisements)



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Lesson Activity 3

In this activity students will learn about the oil industry’s history of climate science denial. They will examine advertisements and practice identifying the science denial techniques that they depict. They will also gain practice debunking misinformation using a variety of strategies.

Setting Up the Activity

Set up the activity by introducing some background information on the history of climate denial and the oil industry, using slide 24.

Split students into groups and instruct them to review the following webpage: “Exxon’s Climate Denial History: A Timeline” <https://www.greenpeace.org/usa/fighting-climate-chaos/exxon-and-the-oil-industry-knew-about-climate-crisis/exxons-climate-denial-history-a-timeline/>

The Activity

1. Pass out Activity Sheet 3 to all students.
2. View the 2 advertisements on slides 27 & 28, one at a time. Teachers may also wish to print copies of the advertisements.
3. Ask students to work in pairs or small groups and follow the Activity Sheet steps to:
 - a) Create a list of evidence, claim(s), or source(s) to question or check.
 - b) Identify the science denial technique(s) depicted in the images.
 - c) Identify a strategy that could be used to debunk the misinformation.
 - d) Develop a question that you could ask to debunk the misinformation.
4. Ask students to explain their answers and lead a short discussion about each advertisement. If time is short, perhaps only deconstruct one image in more detail as a class.
5. Have students respond to some or all the Thinking Questions at the bottom of the Activity Sheet 3 handout. Students should have time to think about the questions individually, then discuss as a class.

Extension

Allow students time to explore an interactive map of Canadian attitudes towards global warming: “Estimated % of adults who think earth is getting warmer” <https://www.umontreal.ca/climat/engl/>

Estimated Time

- 20 minutes

Required Materials

- Slideshow
- Activity Sheet 3
- Evidence Sheet (2 advertisements)
- Timeline of Exxon’s Climate Denial
- Interactive Map
- Devices with internet access



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Culminating Activity

In this culminating activity students will apply their learning to identify science denial techniques used in a song. They will also demonstrate their knowledge of debunking misinformation using a variety of strategies.

Setting Up the Culminating Activity

Set up the culminating activity by explaining that students will listen to a song, “Changing Your Mind,” by a climate denial group “Friends of Science.” Instruct students to pay close attention to the lyrics and images they see.

The Culminating Activity

1. Pass out Culminating Activity Sheet to all students.
2. Listen to the song “Changing Your Mind” by Friends of Science as a class:
https://www.youtube.com/watch?v=9TssZGFMgA&feature=youtu.be&list=TLPQMjAxMDIwMjAWU_kBd7zOTg&ab_channel=FriendsofScience
3. Ask students to independently:
 - a) Create a list of evidence, claim(s), or source(s) to question or check.
 - b) Identify the science denial technique(s) depicted in the ads.
 - c) Identify a strategy that could be used to debunk the misinformation.
 - d) Develop a question that you could ask to debunk the misinformation.
4. Have students respond to the Thinking Questions for this activity, found on the second page of the Culminating Activity Sheet handout.
5. Following the Culminating Activity, review the lesson activities and consolidate learning by discussing the Reflection Questions found on slide 33.

Estimated Time

- 20 minutes

Required Materials

- Slideshow
- Culminating Activity Sheet
- Evidence Sheet (song lyrics)
- Song, “Changing Your Mind”

Success Criteria

- Lists 3 pieces of evidence, claims, or sources to question or check based on the source provided.
- Identifies the science denial technique(s) used in each of the 3 cases.
- Develops 3 questions related to various debunking strategies relevant to climate denial.
- Contributes to small and large group discussions of misinformation and science denial.



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